U.S. Department of Energy • Office of Fossil Energy
National Energy Technology Laboratory

Annual Site Environmental Report

For Calendar Year 2002

DOE/NETL-2004/1201

DOE/NETL-2004/1201

The National Energy Technology Laboratory Annual Site Environmental Report for Calendar Year 2002

October 2003

U.S. Department of Energy
National Energy Technology Laboratory
Morgantown, West Virginia
Pittsburgh, Pennsylvania
Tulsa, Oklahoma
Fairbanks, Alaska

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Disclaimer

Preface

This Site Environmental Report was prepared by the Environmental, Safety, and Health Division at the National Energy Technology Laboratory (NETL) for the U.S. Department of Energy. The purpose of this report is to inform the public and Department of Energy stakeholders of the environmental conditions at NETL sites in Morgantown (MGN), West Virginia, Pittsburgh (PGH), Pennsylvania, Tulsa, Oklahoma, and Fairbanks, Alaska. This report contains the most accurate information that could be collected during the period between January 1, 2002, and December 31, 2002. As stated in DOE Orders 450.1 and 231.1, the purpose of the report is to:

- Characterize site environmental management performance.
- Confirm compliance with environmental standards and requirements.
- Highlight significant facility programs and efforts.

A reader questionnaire/comment form is included on the following page to provide an opportunity for public input on current and future site environmental reports.

Office of Fossil Energy
Commitment to Environment, Safety and Health

Fossil Energy is committed to conducting our mission to achieve the greatest benefit for all our stakeholders, including our employees and the public, while actively adhering to the highest standards for environment, safety, and health. Fossil Energy will continuously improve our practices through effective integration of environment, safety, and health into all facets of work planning and execution. Fossil Energy will make consistent, measurable progress in implementing this commitment throughout our operations while striving for zero injuries, incidents, and environmental releases.

Questionnaire
National Energy Technology Laboratory
2002 Site Environmental Report

Please answer the following questions and return to:

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If you are viewing the electronic version, you can email your response to
elias.george@netl.doe.gov

1. Was the 2002 Site Environmental Report easy to read and understand? If not, please provide a brief explanation.

2. Was the information contained in the report useful? Please provide a brief explanation.

3. Do you feel the report contained all of the information that you would be interested in? If not, please provide a brief explanation.

4. Do you have any comments or suggestions on how the current and future reports can be improved?

5. Other comments or suggestions?

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Executive Summary

The environmental risks at the U.S. Department of Energy (DOE) National Energy Technology Laboratory (NETL) sites in Morgantown (MGN), Pittsburgh (PGH), Tulsa (NPTO), and Fairbanks (AEO) are being successfully managed through execution of its environmental compliance programs. NETL's environmental posture is continually improving by virtue of NETL's pursuit of International Organization for Standardization (ISO) 14001 certification.

There were no new Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)-regulated sites discovered for potential remediation in 2002. NETL continued to conduct inspections, studies, and remediation activities at the Rock Springs, Gillette, and Hanna, Wyoming sites. The National Environmental Policy Act (NEPA) activity involved issuing approximately 200 Categorical Exclusions, 9 draft or final Environmental Assessments, and no Environmental Impact Statements. Substantial progress obtaining ISO 14001 Certification was achieved by conducting four internal audits, site-wide Environmental Management System (EMS) training, two Management Review Team meetings, directives management activities, and implementing several programs aimed at ensuring EMS awareness. There were 3 Notices of Violations (NOVs) issued to NETL associated with its Industrial Sewer Use Permit and 1 letter documenting non-permitted discharge of pH and turbidity into the local surface water system. NETL was in compliance with all other environmental laws and regulations.

No significant environmental problems were identified at NETL sites in 2002. The sites continue to maintain two major environmental compliance programs: waste management, and environmental media and release management. These two programs encompass waste handling, storage, and disposal; waste minimization and pollution prevention; air, surface-water, groundwater, and industrial waste-water quality; and spill control activities. The MGN and PGH sites currently maintain complete monitoring programs for groundwater, storm-water, laboratory waste-water, atmospheric conditions, and air emissions inventory.

A comprehensive Directives Program aimed at managing environmental, safety, and health (ES&H) issues began in 1997 and will be completed in 2003. The primary objective of the program is to identify and implement standards and requirements that will protect the health and safety of workers, the public, and the environment. NETL continued development of new directives and annual reviews of existing directives during 2002. Several new procedures were developed, including (1) Process for Identifying and Maintaining Environmental Aspects, Environmental Objectives and Targets, and Environmental Management Plans (EMPs)(P450.1-6); (2) Calibration and Maintaining of Instruments that Monitor and Measure Key Environmental Characteristics (P450.4-16); and Monitoring and Maintaining Key Environmental Characteristics (P450.4-15). The operating plans and procedures that were revised include (1) the Waste Management Program (O435.1-1); (2) Groundwater Management Program (P450.1-2); and (3) Surface Water Program (P450.1-3).

NETL continued its preparations for independent third party ISO 14001 certification. ISO 14001 is the only international environmental management standard to which an organization can be certified. NETL is using the specifications and guidance from this standard to form an effective EMS for NETL sites. A number of internal ISO audits were conducted during 2002. These audits were used to determine the level of personnel awareness about the EMS. As a result of these audits, NETL focused its efforts on correcting its deficiencies.

A performance measurement system continued to be maintained during 2002. The system is used to evaluate environmental activity effectiveness meeting mission-critical goals. The system also provides data that is then used in gauging performance against the DOE critical success factors, that is, measuring performance against technical objectives. Various environmental milestones are tracked to completion, giving NETL important feedback on how well NETL is meeting the sites' goal to remain in full regulatory compliance and in achieving best-in-class environmental performance.

1 Introduction

The National Energy Technology Laboratory (NETL), (located in Morgantown [MGN], WV, Pittsburgh [PGH], PA, Tulsa, OK, and Fairbanks, AK) is a multi-purpose laboratory owned and operated by the U.S. Department of Energy (DOE). NETL sponsors fossil-fuel programs for the DOE. Our organization, formerly the Federal Energy Technology Center, was established in 1996 through consolidation of Energy Technology Centers at PGH and at MGN. In December 1999, NETL was designated the DOE 15th national laboratory. In August 2000, the National Petroleum Technology Office (NPTO) in Tulsa was assimilated into NETL; and in September 2001, NETL opened the Arctic Energy Office (AEO) in Fairbanks to work with the University of Alaska and other state entities to promote energy-related research in arctic areas. Environmental activity performed at NPTO and AEO in 2002 is included in this report.

NETL is the fossil energy laboratory for DOE, providing expertise in fossil energy supply, delivery, and end-use technologies. The organization's mission is to (1) resolve the environmental, supply, and reliability constraints of producing and using fossil resources; and (2) support the development and deployment of environmental technologies to clean up DOE's weapons complex.

As a Federal organization, NETL conducts both onsite research and development and offsite research and development through contracted programs. A Strategic Center for Natural Gas (SCNG) and six onsite research focus areas have been created. The six focus areas are Vision 21 Advanced Power Systems (pollution minimized modular energy plants), Gas Energy Systems Dynamics (gaseous-fueled power generation systems), Environmental Research (air, soil, and water characterization/treatment), Ultraclean Fuels (for high-efficiency transportation systems), Carbon Sequestration Science (stabilizing atmospheric CO_2 levels), and Computational Energy Science (virtual demonstrations of energy plants of the future). NETL's NPTO site oversees research activities used to develop environmentally acceptable solutions to oil and gas exploration and production. NETL's Arctic Energy Office (AEO) has formed a cooperative agreement with the University of Alaska Fairbanks to support research in two main areas: production, transportation, and use of fossil fuels; and power generation for remote areas.

We have dedicated ourselves to achieving a seamless environmental program. However, since all of the sites are in different states (West Virginia and Pennsylvania sites are more than 60 miles apart) and interface with different state regulatory agencies, some reporting and monitoring issues must be discussed separately in this report.

2 Compliance Summary

During 2002, NETL conducted numerous activities to comply with Federal, state, and local regulations and internal requirements and DOE policies. This report provides information about these activities and data related to compliance. The NPTO and AEO sites consist only of leased commercial office space, which requires only minimal environmental compliance activity. This document does not address regulations where no action was required or when there is no new information to report.

Compliance programs were conducted in areas such as air, water, soil, wastes, and community "Right-to-Know." All solid hazardous wastes were managed and removed from the merged sites within allowable accumulation times specified in the Resource Conservation and Recovery Act (RCRA) and state regulations.

Table 1 is a summary of the compliance status of environmental permits in 2002. The environmental risks at NETL are being successfully managed through execution of its environmental compliance programs. NETL's environmental posture is continually improving by virtue of NETL's pursuit of International Organization for Standardization (ISO) 14001 certification.

No new Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) regulated sites were discovered for potential remediation in 2002. NETL continued to conduct inspections, studies, and remediation activities at the Rock Springs, Gillette, and Hanna, Wyoming sites. The National Environmental Policy Act (NEPA) activity involved issuing approximately 200 Categorical Exclusions, 9 draft or final Environmental Assessments, and no Environmental Impact Statements. Three Notice of Violations (NOVs) were issued to NETL associated with its Industrial Sewer Use Permit and 1 letter documenting non-permitted discharge of pH and turbidity into the local surface water system. NETL was in compliance with all other environmental laws and regulations.

2.1 Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)

The MGN, PGH, Tulsa, and Fairbanks sites had no new CERCLA activities being discovered or conducted in 2002; however, the following sections describe CERCLA-related activity at remote sites in other areas of the United States that remain the total or partial responsibility of NETL. These areas continue to be monitored for appropriate environmental responses.

Table 1. Summary of Environmental Permits

Permit Type	Permit Number	Status
Air	MGN: R13-1768 061 0064 PGH: 7032056-000-00500 7032056-000-00501 7032056-000-00800	MGN: West Virginia Division of Air Quality issues the permits. Right to Construct and Certificate to Operate SynGas Generator/PDU. PGH: Allegheny County issues the permits. Natural gas boilers used for heating B-s and one gas-coal fired research unit.
Water (non-NPDES)	PGH GF 31062.008	Industrial Sewer Use Permit issued by Gannett Fleming Engineers under contract with the Pleasant Hills Authority. Regulates certain constituents of process/laboratory waste-water placed into the sanitary sewer system. Three Notices of Violations (2 free cyanide, 1 mercury) were issued in 2002.
Water (NPDES)	MGN: MUB Permit No. 012 WV0111457 PGH: Part I - PA0025844 Part II - 0297201	MGN: All monitored parameters were within permit limitations during 2002. PGH: Part I for a National Pollutant Discharge Elimination System (NPDES) storm-water discharge permit issued by PaDEP. Part II for an industrial settling weir owned by NIOSH. All monitored parameters were within permit limitations during 2002. Application for renewal of the expired permit was made to PaDEP in 2001. As of October 2003 no renewal has been provided. Storm-water discharges are being allowed under the terms of the expired permit.
Storage Tanks	PGH: 02-81183008A 02-81183009A 02-81183010A	Above-ground storage tank permits issued by PaDEP. 02-81183012A was removed September 2002 and the site is awaiting the revised registration certificate.
Asbestos	PGH: PAA - 010683	Asbestos Abatement Permits Issued through the Allegheny County Pennsylvania, Health Department, Air Pollution Division.

Rock Springs, Wyoming

In Rock Springs, WY, the Rock Springs Oil Shale Retort site consists of 13 locations where in-situ shale fracturing and retorting research were conducted. As a result of research activities, groundwater was contaminated with organic compounds that must be cleaned up to standards set forth in the Wyoming Environmental Quality Act. Although the Rock Springs site was not listed on the Federal Agency Hazardous Waste Compliance Docket, NETL proactively tasked the Tennessee Valley Authority (TVA) to conduct a Preliminary Assessment (PA) of the site in 1993, in accordance with CERCLA, to determine if the site should be placed on the national priority list (NPL). After reviewing the PA, which resulted in a score of 2, U.S. Environmental Protection Agency (EPA) Region VIII classified the site as “site evaluation accomplished” (SEA) under the Federal Superfund Program and notified NETL that the site would not be evaluated further for inclusion on the NPL. As a result, DOE must satisfy Wyoming state requirements as defined by the Wyoming Environmental Quality Act.

An Environmental Assessment of the remediation alternatives for the Rock Springs Oil Shale Retort Site was conducted in 2000. The Finding of No Significant Impacts was signed on

July 31, 2000. Completion of the NEPA process allowed design and construction of the preferred remedial alternatives to go forward.

Pilot demonstrations were designed and constructed at sites 4, 7, 9, and 12. Air injection and bioremediation actions were undertaken at each of the four sites. A more aggressive air sparge system was used at sites 4 and 7, minimal aeration/water extraction and injection with nutrient injection was demonstrated at Site 9, and minimal air injection/water extraction and injection was used at Site 12. The demonstrations were conducted through August 2000, at which time an evaluation was conducted to determine the preferred remedial alternative for each site.

Air sparge/bioremediation was determined to be the best remedial alternative for sites 4, 7, and 9. The air sparge systems were designed and constructed in 2001 and are operating as designed. Site 12 feasibility studies were conducted at the Rock Springs site by the University of Wyoming, Environmental Engineering Department. Bioaugmentation has been determined to be the most effective remedial action for contaminant removal at Site 12. Concept design has been completed and bacterial cultures will be augmented and injected by July, 2003. Sites 4, 7 and 9 continue to show reductions of benzene, ethyl benzene, toluene, and xylene (BTEX). Contaminant levels have been reduced by approximately 93 percent at sites 4 and 7, and site 9 contamination has been reduced by approximately 86 percent, as reflected in the most recent analytical data.

Three additional groundwater wells were installed at Site 6 in 2002 to determine contaminant level and extent, and ground water samples were collected and analyzed. Contaminant levels ranged from 8 parts per billion (ppb) to 37 ppb. Additional wells will be installed if data gaps are present. A security fence and small compressor B- will be erected in 2003.

Gillette, Wyoming

In Gillette, WY, the Hoe Creek Underground Coal Gasification site consists of three locations where coal was gasified in situ. As a result of the field tests, coal tars remain underground in two coal seams and in the channel sand overburden. Water flowing through the coal and the channel sand is leaching organic compounds from source materials into the groundwater, and contaminant levels have exceeded state regulatory limits. Annual pump and treat operations have been conducted during summer months as an interim measure to minimize any contaminated groundwater movement out of the boundaries of the research and development (R&D) permit area onto private lands. Contaminated groundwater has migrated onto one private landowner's property east of the permit area. From 1994 through 1996, in an attempt to contain the contamination on the permit area, approximately 14,127,000 L (3,774,000 gal) of water were pumped, treated by routing through an activated granular carbon system, and applied to the ground surface by a spray system through atomizing nozzles.

The Hoe Creek site was listed on the Federal Agency Hazardous Waste Compliance Docket on June 1, 1991. A PA of the Hoe Creek site was conducted in 1993, in accordance with CERCLA requirements, to determine if the site should be placed on the NPL. After reviewing the PA, which indicated a score of 14, the EPA Region VIII Office classified the site as SEA under the Federal Superfund Program and notified NETL that the site would not be evaluated further for

inclusion on the NPL. As a result, only requirements imposed by the Wyoming Environmental Quality Act must be met.

There are three areas at the Hoe Creek site. Hoe Creek I area is uncontaminated and requires no remediation. An air sparge/bioremediation system was completed at the Hoe Creek II area of the Hoe Creek site on February 7, 1998. Air is being injected into the Felix I and II aquifers through 64 wells that were completed during the construction phase. Two 75-HP electric compressors supply the air necessary for delivery to the groundwater system for air sparging actions. Groundwater samples were extracted three times per year, and occurred at 111-day intervals (Day 111, 222, 333). The balance of days per year are consumed by periods of shutdown prior to sampling, and start-up time periods before resumption of air sparging activities.

Construction of the Hoe Creek III air sparge/bioremediation system was initiated during October 1998, and completed in February, 1999. Fifty air sparge wells were completed in the Felix I and II aquifers, with six wells installed as a sparge curtain down-gradient from the well field. Two 100-HP electric compressors supply the air necessary for delivery to the groundwater system for air sparging actions. Groundwater samples were collected three times per year, and occurred at Day 111, 222, and 333.

The Hoe Creek II and III systems operated as designed, with no major problems, during calendar year 2002. Ground water contaminant levels continue to be reduced, with only 5 of the 26 wells in the semi-annual sampling network showing BTEX contaminants. Total BTEX contaminant values ranged from 7 ppb to 37 ppb. Monitor wells off-site showed no contaminant levels. It is anticipated that the air sparge/bioremediation systems at Hoe Creek II and III will continue operation for the next 3 years. Alternating 6-month shut-down periods to evaluate contaminant rebound levels in the ground water, as recommended by the Wyoming Department of Environmental Quality (WDEQ), will be conducted at the Hoe Creek II and III sites. Groundwater remediation must continue until water quality is returned to baseline conditions or to a class of use through “best practicable technology,” as required by the WDEQ.

Hanna, Wyoming

The Hanna Underground Coal Gasification site’s experiments were conducted in the 1970s, and the WDEQ approved groundwater restoration for the site. Revegetation of the site surface remains to be accomplished prior to the WDEQ giving a final release and allowing termination of the R&D (license) permit. A revegetation evaluation, conducted on reclaimed areas on the permit area in 1998, indicated vegetation density, productivity, and species diversity are close to satisfying the WDEQ requirements for final release. It was determined by the WDEQ during the annual inspection in 2002 that bond release and permit termination could be completed by spring 2004.

The Rocky Mountain I Underground Coal Gasification site’s experiments were conducted in the late 1980s, and the WDEQ has approved groundwater restoration for the site. Vegetation cover, productivity, species diversity, and shrub-density data must be collected in 2002 and 2003 to satisfy all requirements for the WDEQ and the Federal Office of Surface Mining. Activities in 2002 consisted of the annual inspection by the WDEQ, spraying Canada Thistle to reduce the

infestations of noxious weeds on the R&D permit area, and conducting revegetation studies to evaluate vegetation cover and production, species diversity, and shrub density. Similar studies must be conducted in 2003, and bond-release data must be submitted to the WDEQ for approval of reclamation performance bond release in 2004.

2.2 Superfund Amendment and Reauthorization Act

Title III of the Superfund Amendment and Reauthorization Act (SARA) of 1986 is known as the Emergency Planning and Community Right-to-Know Act (EPCRA). This act requires owners or operators of facilities that have certain hazardous chemicals on their site to provide information on the release, storage, and use of those chemicals to organizations responsible for emergency response planning. Executive Order (E.O.) 12856, signed by President Clinton on August 3, 1993, directs all Federal agencies to comply with the requirements of EPCRA, including SARA 313 Toxic Release Inventory Program.

All EPCRA reporting requirements pertinent to NETL have been met at the MGN and PGH sites. Table 2 identifies those requirements for which NETL has filed or will be required to report in the event of an occurrence. Tulsa and Fairbanks do not require EPCRA reporting.

Table 2. Emergency Planning and Community Right-to-Know Act Reporting

Reporting Requirements	Yes	No	Not Required
EPCRA 302-303: Planning Notification	X (PGH)		X (MGN)
EPCRA 304: EHS Release Notification	X		
EPCRA 311-312: MSDS/Chemical Inventory	X		
EPCRA 313: TRI Reporting			X

Note: Because of differences in the hazards at each site, the EPCRA reporting requirements for sections 302 and 303 are not the same at the two sites.

Section 302 of EPCRA requires the owner or operator of any facility at which an extremely hazardous substance is present in amounts equal to or greater than specified threshold planning quantities to notify the State Emergency Response Commission (SERC) that the facility is subject to the emergency planning requirements. Section 303 of EPCRA requires the facility to designate a facility representative to participate in local emergency planning as a facility emergency-response coordinator. The PGH site has previously notified the emergency response commission under sections 302 and 303, and periodically updates emergency contact information with revised section 311/312 submittals. The MGN and PGH sites fall under the requirements of EPCRA 304, and in the event of a release are subject to the emergency notification requirements under Section 103(a) of the CERCLA of 1980. No releases required emergency notification during this 2002 reporting period.

SARA Title III requirements call for reporting all hazardous chemicals present at the facility during the preceding calendar year in amounts equal to or greater than 10,000 lb, extremely hazardous substances at the facility in an amount greater than or equal to 500 lb (or 55 gal), or

amounts greater than or equal to the threshold planning Quantity (TPQ), whichever is less. Table 3 lists those chemicals reported by NETL for 2002. Section 312 directs the owner or operator to prepare or have a material safety data sheet (MSDS) available for hazardous chemicals, and to submit an emergency and hazardous chemical inventory form by March 1 of each year, if the amount of the chemical equals or exceeds the TPQ. NETL maintains an active inventory of all hazardous materials on site along with the MSDS for each of these substances. The state and local emergency planning committees and local fire departments have been advised of all materials, quantities, and their location at NETL sites. MSDS information on all materials is available.

Table 3. SARA Title III, Tier II Chemical Inventory Reporting List

Chemical Name	Quantity (lb)	TPQ (lb)	Physical Hazards	Health Hazards
Carbon Dioxide (MGN)	95,000	10,000	Pressure	Immediate (Acute)
Sulfuric Acid (MGN)	34,300	1,000	N/A	Immediate (Acute)
Liquid nitrogen (MGN)	57,160	10,000	Pressure	Immediate (Acute)
Sulfur dioxide (PGH)	1635	500	Fire Pressure	Immediate (Acute) Delayed (Chronic)
Nitric oxide (PGH)	240	100	Fire Pressure	Immediate (Acute) Delayed (Chronic)
Liquid nitrogen (PGH)	99,400	10,000	Pressure	Immediate (Acute)

Submission of the Tier II Hazardous Chemical Inventory Form meets Section 312 requirements under the Pennsylvania Hazardous Material Emergency Planning and Response Act (Act 165). Section 313 of EPCRA, the Toxic Release Inventory (TRI) Reporting Program, requires the owner or operator of certain facilities that manufacture, process, or otherwise use listed toxic chemicals above threshold amounts to submit to EPA and designated State officials annual toxic chemical release inventory forms (Form R) for such toxic chemicals released into the environment. NETL did not exceed the threshold amounts for the listed toxic chemicals and thus was not required to submit a Form R.

2.3 Clean Air Act

Air pollutant emissions are regulated under the Clean Air Act (CAA) as amended (42 USC 7401 through 7642). EPA's regulations are contained in 40 U.S. Code of Federal Regulations (CFR) 50 through 87.

West Virginia regulates ambient air quality through the West Virginia Department of Environmental Protection (WVDEP) Division of Air Quality. The West Virginia Air Pollution Control Regulations are in Title 45 WV Code; and Series 1-7a, 10, 11, 13-15, and 17-26.

Pennsylvania regulates ambient air quality at the PGH site through the Allegheny County Health Department's Bureau of Air Quality Control in PGH, PA. The Pennsylvania Air Pollution Control regulations are in 25 PA Code, Chapters 123, 127, 131, 135, and 139. Allegheny County regulations are in the Air Pollution Control Article XXI.

NETL does not fall under the National Emission Standards for Hazardous Air Pollutants (NESHAP) for radionuclide emissions (40 CFR 61, Subpart H) at either the PGH or the MGN sites. As further explained in section 5 of this report, NETL did not release any radionuclides into the environment, as all of its sources are sealed and are used in instrumentation. Similarly, non-radionuclide air emissions at the sites are not significant. (See Table 4.) Total estimated air emissions were slightly higher from 2001 because of a change in emission estimation software required by the regulatory agency. The newer software takes a conservative approach in estimating air emissions. There were no air quality permit limits exceeded or regulatory non-compliances during 2002.

Table 4. Estimated Air Emissions for 2002

Pollutant	MGN	PGH
	(tons per year)	
Nitrous Oxides (NO_X)	8.837	0.987
Sulfur Dioxide (SO_2)	0.030	4.394
Carbon Monoxide (CO)	1.90	0.389
Volatile Organic Compounds (VOC)	0.567	0.129
Particulates	0.873	6.938

Air Permits

For the PGH site, NETL held three air permits in effect during 2002, issued by the Allegheny County Health Department. One permit (7032056-000-00500) was for a 4,500,000 Btu/hr Cleaver Brooks Natural Gas Boiler, located in B- (B)-922. The second permit (7032056-000-00501) was for three RayPak Finned Coppertube boilers, in B-922, each having a 1,630,000 Btu/hr input rating. Permit 7023056-000-00800 was for the 500 lb/hr gas and coal-fired research unit located in B-86. During 2002, the site continued to be an administratively synthetic minor source under CAA Title V by voluntarily limiting its operating time of its research unit to a maximum 2,400 h/yr burning 100-percent coal.

As part of Article XXI, and to comply with Title V of the 1990 CAA Amendments, NETL submitted an application in 1996 for one new plant-wide permit for the PGH site. A comprehensive annual air emissions inventory was an integral part of the application. The site was notified that the application was accepted as administratively complete. NETL is currently awaiting the technical review of the application.

On May 1, 1995, the MGN site received air permit R13-1768 from the West Virginia Office of

Air Quality (OAQ) and constructed an experimental synthetic gas (syngas) generator/hot gas desulfurization process development unit (PDU) at the site. NETL renewed the certificate annually to operate the syngas generator/PDU (Certificate 061 0064) from July 1 through June 30 in 2000 and 2001. An integrated shakedown of the syngas generator and PDU occurred in the spring and summer of 2001, followed by test program operations that will be used to develop gas cleanup technologies for advanced, integrated, coal-gasification combined-cycle power-generation systems. Operating summaries required by the PDU permit are submitted quarterly.

Emission Source Inspections

EPA requires all major air sources to be inspected annually to ensure compliance with existing site air permits. An annual inspection of the PGH site's air emission sources was conducted by the Allegheny County Health Department's Air Quality Program Division in September 2002. Inspection results showed that the site was in compliance.

The PGH site maintained three 30-ft meteorological towers that monitored temperature, relative humidity, precipitation, and wind speed. Data were collected twice per week, and were used in the site's heating, ventilation, and air conditioning (HVAC) maintenance programs, emergency preparedness program, and air monitoring program.

In addition, the PGH site conducted a stratospheric ozone depletion program to recover and reclaim chlorofluorocarbons (CFC) from HVAC equipment. All CFC-containing equipment was inventoried, and measures are being taken to phase out these materials.

In MGN, site air emissions were inventoried quarterly to assess whether permit conditions were being met and if any additional permits or permit modifications were needed. Emissions were measured, estimated by EPA methods, or projected by combustion and mass balance calculations. The 2002 air emissions inventory revealed that emissions were minor and were consistent with the estimations made the previous year. The site is a minor source of emissions and no Title V permit is required.

In MGN, data from the 150-ft free-standing meteorological tower were used to report storm-water information. Additionally, the information was available to the Emergency Operations Center (EOC) as needed to predict the effects of accidental and non-routine releases.

2.4 Clean Water Act and the National Pollutant Discharge Elimination System (NPDES)

Waste-water discharges are regulated under the Clean Water Act (CWA) (33 USC 1251 et seq.) and subsequent Federal regulations (40 CFR parts 121, 122, 125, 136, 405-471). West Virginia and Pennsylvania are NPDES–authorized states. West Virginia NPDES regulations are codified in Title 46-West Virginia codes 1 and 2. Pennsylvania NPDES regulations are codified in 25 Pennsylvania Code chapters 16, 91-95, 97, 101, and 102.
NETL's PGH site is essentially divided into two distinct portions—the areas north and south of Wallace Road. As described below, the north area houses all the laboratory and process areas for

the site. Treated effluent from the site's waste-water treatment facility (WWTF) and sanitary sewage from this area are routed to, and given final treatment in, the Pleasant Hills publicly-owned sewage treatment facility. Collected storm-water exits the site's north area through the north storm-sewer system, which enters nearby Lick Run through the NPDES-permitted North Outfall (001). The south area of NETL-PGH houses the site administrative, project management, and site maintenance functions. All sanitary sewage is routed to, and treated in, the Clairton publicly-owned municipal sewage treatment facility. Collected storm-water exits the site's south area through the south storm sewer system which enters nearby Lick Run through the NPDES-permitted South Outfall (002).

NETL shares the north portion of the 238-acre Bruceton Research Center with two other Federal agencies, the U.S. Department of Health and Human Services, Centers for Disease Control and Prevention (CDC), National Institute for Occupational Safety and Health (NIOSH) and the U.S. Department of Labor Mine Safety and Health Administration.

All treated laboratory and process waste-water from the PGH site is regulated at the local level under the Pleasant Hills Industrial Sewer Use Permit Program. Treatment in the site WWTF consists of flow equalization with subsequent neutralization by adding caustic soda or ferric chloride. Metals and particulates are removed by agglomeration in the flocculation tank, coupled with solids separation in the plate separator, and final removal occurs in the filter press. An activated clay/activated carbon filtration system was added in June 2000 to provide additional removal of organics and metals from the treated waste-water prior to discharge into the sanitary sewer. The effluent can be recirculated from the point just beyond the plate separator (prior to the filtration system) if additional predischarge treatment is required.

NETL was issued an Industrial Sewer Use Permit (ISUP) in December 1999 by the PA Pleasant Hills Authority (PHA) as required by the CWA. The conditions placed on NETL by the permit limit the quantity of effluent constituents (free cyanide, phenolics, mercury, copper, chloroform, and pH) that may be discharged in the waste-water stream. The permit requires NETL to submit to PHA's consulting engineering firm, Gannett Fleming, waste-water analysis data semi-annually for the B-74 effluent. In addition, NETL provides Gannett Fleming with monthly sanitary waste-water sampling results and a self-monitoring report semi-annually for the sub-interceptor location. The sub-interceptor location is the point at which sanitary waste from the CDC/NIOSH area is combined with sanitary waste-water from NETL. NETL is also required to prepare an annual industrial waste survey report that contains no sampling data. In addition, PHA conducts independent sampling of these locations. All of this information is used by the PHA to determine whether any discharges of the treated effluent were in excess of the local limits and required issuance of a NOV.

NETL received three Notices of Enforcement Action Letters of Violation or NOVs during 2002. One NOV (cyanide exceeded) was received on August 14, another (cyanide exceeded) on November 18, and a third (mercury exceeded) on November 21. See Section 3.5.2 Environmental Occurrences in this report for a more complete description of the three NOVs received in 2002. No penalties were assessed for these three NOVs. Not all exceeded permit limits resulted in the issuance of a NOV from the PHA. Table 11 in the Appendix presents the monthly waste-water effluent sampling results that includes the three exceeded limits in 2002 that resulted in the issuance of a NOV, as well as three other exceeded limits that were not cited

by the PHA (exceeded limits are indicated by shading). Table 12 in the Appendix presents the semiannual waste-water effluent sampling results for B-74 Industrial Sewer Use Permit. This sampling is required by the PHA ISUP. Table 12 also presents the semi-annual sampling preformed by NETL at the sub-interceptor location, which is not required by the permit. There are three parameters for which the permit limits were exceeded in Table 12 (indicated by shading) that did not result in the issue of a NOV. None of the separate grab samples analyzed exceeded permit limits.

The sub-interceptor pipe into which NETL's sanitary sewage is discharged is separate from the interceptor into which the treated laboratory/process waste-water is discharged. Periodic sampling/analysis of the sanitary sewage from all three Federal agencies entering the common - site sanitary-sewage system sub-interceptor is also performed by the PHA. Analytes for this waste stream are the same as for the industrial waste-water. Sampling of the effluent in this shared sub-interceptor location revealed that NETL-generated sanitary sewage contribution was not a source of any violations. Consequently, NETL was removed from the sub-interceptor stream sampling requirement beginning in 2001. However, NETL continues to perform sampling of this waste-water stream at the request of the PHA.

NETL implemented a program to manually transfer the B- 141 laboratory waste-water holding tank (LWHT) to the WWTF for treatment. This has allowed greater control over the quality of the treated effluent, especially in view of the installation of the additional filtration system. In addition, since this has removed the LWHT as a source of direct discharge to the sanitary sewer, sampling/analysis of the LWHT water is no longer required.

PGH received NPDES Storm Water Permit PA0025844 in June 1996. PGH is required to monitor and report the results of two outfalls quarterly. (See Table 10.) North Outfall monitoring parameters are flow, suspended solids, carbonaceous biochemical oxygen demand 5-day test ($CBOD_5$), oil and grease, aluminum, iron, manganese, lead, mercury, pH, and ammonia. The South Outfall monitoring parameters are flow, suspended solids, aluminum, iron, manganese, lead, pH, and ammonia. All monitored parameters were within permit limitations in 2002.

At the MGN site, NETL retained two permits under the NPDES during 2002. One pretreatment permit, Morgantown Utility Board (MUB) Permit 012, was issued by MUB for the discharge of sanitary and pretreated industrial waste-water to MGN's municipal sewer system Publicly Owned Treatment Works (POTW). This permit was renewed in July 2000. Industrial waste-water consists of laboratory sink waste-water, motor pool waste-water, condensates, and boiler blow-down. The waste-water is pretreated by a 16-ft-diameter clarifier and a 12 x 16 ft sludge drying bed. The waste-water is also treated to control pH. All monitored parameters were within permit limitations in 2002.

The other MGN permit issued under the NPDES was WV/NPDES Permit WV0111457, General Permit Registration WVG610042, issued by the West Virginia Department of Commerce, Labor and Environmental Resources Division of Environmental Protection, for the discharge of storm-water to Burroughs Run and West Run. (See Table 10.) As stated in the WV/NPDES permit approval letter, NETL-MGN is required under the terms and conditions of this permit to (1) monitor semiannually and report annually to the State of West Virginia from outfalls 002, 005, and 010; and (2) maintain a storm-water pollution prevention plan and a groundwater protection

plan, both to be retained on site and made available for state review as requested. All monitored parameters were within permit limitations in 2002.

2.5 Resource Conservation and Recovery Act

RCRA (42 U.S. Code 6901 et seq.) regulates the generation and management of hazardous wastes at the Federal level. EPA's hazardous waste regulations are codified in Title 40 CFR parts 260-271. The WVDEP (MGN) and Pennsylvania Department of Environmental Protection (PaDEP) (PGH) are authorized to oversee much of the EPA's requirements. No notices of violations were issued to either party in 2002.

NETL is a large quantity generator in both PGH and MGN, and does not generate hazardous waste in Tulsa or Fairbanks. The PGH EPA identification number is PA8890031869 and the MGN EPA identification number is WV7890031886. The total amount in 2002 for RCRA hazardous waste was 162 ft^3 in PGH and 46.8 ft^3 in MGN.

Compliance with DOE Orders, respective state regulations, applicable EPA regulations, and U.S. Department of Transportation (DOT) regulations is ensured through vigilant contractor and Federal personnel involvement. Hazardous Waste Manifests are reviewed carefully by at least two different contractor and Federal personnel to check for omissions and errors.

Table 5 shows the status of above-ground storage tanks at PGH and MGN. Pennsylvania requires all above-ground storage tanks above a specific volume to be registered, but West Virginia does not require registration of above-ground storage tanks. All MGN above-ground storage tanks are shown in Table 5, but only those that require registration are listed for the PGH site.

2.6 Safe Drinking Water Act

Drinking water requirements are codified under the Safe Drinking Water Act (SDWA) (42 USC 300f through 330j - 11), and regulated in 40 CFR parts 141-143. NETL is classified as a non-transient, non-community water system under these laws and regulations. Because NETL does not provide treatment or storage of this water, the monitoring requirements of a public water supplier are not required; however, the MGN and PGH sites conducted sampling and analysis programs at selected potable water locations and compared samples against the SDWA primary and secondary regulatory standards.

MGN receives its potable water supply from the city of MGN. Samples were taken in May and July 2002 from potable water locations and tested. No samples equaled or exceeded SDWA limits in 2002.

Table 5. Above-Ground Storage Tanks

Location	Description	Capacity (U.S. Gallons)	Active or Inactive	Comments
NETL-PGH	Waste Oil Holding Tank	950	Inactive	Taken out of service in 1992.
NETL-PGH	Caustic Soda Tank	1,500	Active	
NETL-PGH	Ferric Chloride Tank	1,500	Active	
NETL-PGH	Heating Oil Tank	2,200	Inactive	Removed from site 2002.
NETL-MGN Outside B13	Diesel Fuel Storage (Double Tank)	50	Active	Used for research equipment.
NETL-MGN Outside B29	Diesel Fuel Storage (Double Tank, Bermed)	250	Active	Vehicle fuel.
NETL-MGN Outside B29	Gasoline Fuel Storage (Double Tank, Bermed)	500	Active	Vehicle fuel.
NETL-MGN Outside B34	Diesel Fuel Storage (Double tank)	50	Active	Emergency generator fuel.
NETL-MGN Outside Navy Facility	Diesel Fuel Storage (Double Tank)	1,000	Active	Emergency generator fuel.

PGH receives its water supply from the Pennsylvania American Water Company. Water was sampled and analyzed for compliance with 37 primary and secondary drinking water standards. Nine representative locations were tested in 2002. In addition, 47 water coolers were sampled and tested for lead, copper, and corrosiveness (pH). All of the samples met the applicable water quality criteria; therefore, no corrective actions were taken.

2.7 Toxic Substances Control Act

Requirements for managing polychlorinated biphenyls (PCBs), asbestos, and lead are codified in Toxic Substances Control Act (TSCA) 15 USC 2601-2654. EPA regulations addressing PCBs and asbestos in conjunction with the TSCA are codified in 40 CFR 761 and 763, respectively. Asbestos is also regulated under CAA (40 CFR 61, Subpart M); U.S. Occupational Safety and Health Administration (OSHA) (29 CFR 1910.1001, 29 CFR 1926.1101); and Pennsylvania's Allegheny County Health Department (ACHD) Article XXI.

All PCB-containing transformers have been removed from both the PGH and MGN sites or flushed to remove the PCBs and refilled with a non-PCB fluid during prior years. All fluorescent lamp ballasts were presumed to contain PCBs and were properly disposed of in an EPA-approved landfill.

NETL typically initiates asbestos abatement action for four reasons: decommissioning and demolition operations; remodeling and reconstruction operations; asbestos floor tile concerns; and providing an "asbestos free" work place. NETL-PGH abated 9 yd^3 of asbestos waste in 2002 using two permits that were issued by ACHD. This included the abatement of 3 yd^3 of asbestos

waste from gasket material used to seal glass block in B-58 and abatement of 6 yd^3 from the Occupational Medicine facility also in B-58. Both the asbestos abatement/removal contractor (AA/RC) and the independent third-party industrial hygiene monitoring companies were registered with the ACHD. All AA/RC employees were trained and licensed by both ACHD and the Pennsylvania Department of Labor and Industry. All asbestos containing waste was disposed in an EPA approved landfill.

A full asbestos survey of all MGN site facilities was completed during 1992. No known friable asbestos remains on the MGN site. Non-friable asbestos remains on site in such asbestos-containing materials (ACM) as building panels made of a cement-asbestos mixture. The current management plan for asbestos at NETL-MGN is to manage in place; abating asbestos only when it becomes necessary because of construction, renovation, or maintenance. Facility plans and work orders are reviewed during the planning stages for asbestos disturbance. Known ACM is labeled.

At the MGN site, all abatement of asbestos and ACM was conducted by West Virginia licensed asbestos abatement contractors. All abated asbestos and ACMs was properly disposed in asbestos-approved landfills. Various small asbestos abatement activities were completed throughout the year at various locations on site, primarily drilling holes through asbestos-content solid wall panels for new conduit or pipe runs.

There was no lead abatement required at the PGH site in 2002.

A survey of lead-based paint at the MGN site was completed in early 1997. A priority list was made for lead-paint removal projects, based on conditions of paint and proximity to workers. A multi-year lead paint abatement plan for the site's pipe bridge supports has continued; the lead hazard has been eliminated from all fire fighting apparatus, support posts of the site-wide pipe bridge, a safety screen over a cooling pit, and a metal building. A WV-contractor-licensed business does the removal, and lead paint debris was disposed by site-support-contractor hazardous waste personnel.

2.8 Federal Insecticide, Fungicide, and Rodenticide Act

Pesticide requirements are codified under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) 7 USCS §§136, et seq. EPA pesticide regulations are documented in 40 CFR, parts 162, 166, and 171. Pennsylvania pesticide regulations are cited in 7 Pa. Code 128. Allegheny County, PA pesticide regulations are cited in ACHD Article III.

An integrated pest management program was implemented at the PGH site to comply with Federal, state, and local pest management requirements, as well as executive orders. All pesticide/herbicide applicators were trained and licensed by the PaDEP. All pesticide and herbicide MSDS and all technical specification sheets were submitted for review and approval prior to use. No pesticides or herbicides were stored onsite. The applicator brought only the

minimum quantity necessary for that day's work. Because there was no waste, there was no need to store the materials.

Pest control for buildings at the PGH site was limited to "banding" (a technique in which aqueous solutions of Demand CS® are sprayed on the foundations of B-s and Talstar EZ® crystals are dispersed on the grassy surrounds of buildings). Indoor applications were limited to an as-needed basis. The PGH cafeteria was treated monthly with a "crack and crevice control" technique. A hand-pumped, atomizing spray tank-wand containing an aqueous solution of Demand CS® was used to treat baseboards, door thresholds, and through-wall water pipes. Sting insect nests were sprayed with an aerosol wasp freeze and dusted with Delta Dust®. Carpenter ants were treated with Demand CS®. Poison Sumac was treated with a mixture of Round-up® and HyVar XL®.

Pest control for buildings at the MGN site was performed monthly or as needed, and entailed spraying interior baseboards and corners. No FIFRA-regulated materials were stored onsite. The use of pesticides at MGN was limited to materials that are not classified by the EPA for restricted use. Compliance was verified by comparing the MSDS for the onsite material with the applicable standard. Pesticides were applied by qualified contractors using certified personnel. The only site personnel who applied pesticides were maintenance technicians. Occasionally over-the-counter sprays are used on nests built in, or on, outside equipment. MSDSs are obtained and kept for these sprays.

2.9 National Environmental Policy Act (NEPA)

NEPA - 42 U.S.C. 4321 et seq. of 1969 established Federal policy for protecting environmental quality. Under this policy, an environmental impact statement (EIS) must be prepared (1) to evaluate the environmental consequences of any major Federal action that might have significant impact on the quality of the human environment, and (2) to include a comparative analysis of reasonable alternatives to accomplish the goals to be addressed by the Federal action. Based on the EIS, a Record of Decision would be prepared to document the alternative selected for pursuit by the Federal agency. If the need for an EIS is not clear or if a proposed action has uncertain potential for environmental impacts, but does not meet the criteria specified by DOE for preparation of an EIS, an environmental assessment (EA) would be prepared. Subsequent to preparing an EA, either a decision would be made to prepare an EIS or a Finding of No Significant Impact (FONSI) would be issued if an EIS was determined to be unnecessary.

Certain classes of actions that do not have a significant effect on the environment, either individually or cumulatively, can be categorically excluded from more in-depth NEPA review (i.e., preparation of either an EIS or EA). DOE's NEPA implementing procedures (10 CFR 1021) identify those categories of excluded actions and the eligibility criteria for their application.

Performance

NETL conducts NEPA reviews for proposed onsite actions and off-site Federal actions, which are planned in cooperation with other government organizations, educational institutions, or private industry. During 2002, approximately 200 NEPA reviews resulted in issuing categorical exclusions.

During 2002, a final EA (DOE/EA-1402) was completed for the Port of Tillamook Bay Dairy Digester Project, a technology development effort in Tillamook County, OR, to investigate centralized energy recovery using farm animal manure. The EA resulted in a decision that the project would have no significant impact, and a FONSI was issued.

A final EA (DOE/EA-1416) was completed for demonstrating an Integrated Power Generation System for Coal Mine Waste Methane Utilization in Monongalia County, WV. In this system, coal mine waste methane would be collected and used for the production of electric power. The EA resulted in issuance of a FONSI.

A final EA (DOE/EA-1417) was completed for a Gas-to-Liquids Fuels Production and Demonstration Project at the Tulsa Port of Catoosa, OK, for constructing a 70 barrel-per-day facility to produce clean liquid transportation fuels (primarily diesel fuel) from natural gas. The fuel would be tested in fleet vehicles in Alaska and the Washington, DC, area. The EA resulted in issuance of a FONSI.

A final EA (DOE/EA-1418) was completed for a project to demonstrate an Advanced Hybrid Particulate Collector at a 450-megawatt (MW) power plant in Grant County, SD. The advanced system would combine attributes of an electrostatic precipitator and a fabric filter with the expectation of improved particulate collection efficiencies over all size ranges of particles. The EA resulted in issuance of a FONSI.

A draft EA (DOE/EA-1419) was prepared for a project to demonstrate an innovative system for improving the efficiency and reducing the cost of nitrogen oxide control at power plants. The innovative combustion system would be tested at a 340-MW coal-fired boiler in a power plant in Sheboygan, WI.

A draft EA (DOE/EA-1420) was prepared for a project to test Enhanced Coal Bed Methane Production and Sequestration of CO_2 in Unmineable Coal Seams, to test the use of carbon dioxide injection into a coal seam for both enhanced methane recovery and carbon sequestration. The project would be located in Marshall County, WV.

A final EA (DOE/EA-1444) was prepared for a construction project at the NETL site in WV. New facilities, comprising an administrative office building, a child-care facility, a parking garage, and a storm water retention pond, would be installed. The EA resulted in issuance of a FONSI.

A final EA (DOE/EA-1445) was prepared for constructing a child-care facility at the NETL site in Pennsylvania. The EA resulted in issuance of a FONSI.

A final EA (DOE/EA-1449) was prepared for a project to demonstrate Manufactured Aggregate Processing Technology Utilizing Spray Dryer Ash at an existing power plant in King George County, VA. The project would use ash generated at the power plant to produce lightweight aggregate for use in manufacturing masonry blocks or concrete. The EA resulted in issuance of a FONSI.

No new Environmental Impact Statement (EIS) decisions were made in 2002.

Preparation of an EIS document for the Low Emission Boiler System Proof-of-Concept Project (DOE/EIS-0284) at Elkhart, IL, continued, and preparation of an EIS for the Kentucky Pioneer Integrated Gasification Combined Cycle Demonstration Project (DOE/EIS-0318) in Clark County, KY, was completed. Development of a Record of Decision for the demonstration project in Kentucky was initiated.

Preparation of EIS documents on the following two projects was suspended pending resolution of issues related to financial aspects of the proposed projects:

- Clean Power from Integrated Coal/Ore Reduction (CPICOR) (DOE/EIS-0280) at Vineyard, UT.
- McIntosh Unit 4 Pressurized Circulating Fluidized-Bed Demonstration Project (DOE/EIS0282) at Lakeland, FL

2.10 Federal Facility Compliance Act (FFCA)

The FFCA is an amendment to RCRA, initiated as a result of states protesting the protection of Federal facilities from fines or penalties. The congressional intent was to waive the sovereign immunity of Federal agencies and require them to comply with the full range of enforcement tools available to all regulatory authorities. Under the FFCA, there is explicit authority to issue administrative compliance orders that are RCRA violations. In addition, the FFCA requires that EPA conduct annual inspections of Federal facilities with RCRA Part B permits.

FFCA also encourages Federal facilities to seek voluntary resolution to environmental challenges. NETL sites are not currently under onsite consent agreements and are not RCRA Part B facilities. However, NETL conducts their environmental programs according to applicable Federal, state, and local regulations.

2.11 Other Environmental Statutes

The PGH site completed an ecological baseline risk assessment in June 1998. Based on the site-specific and regional ecology, several ecological receptors are potentially at risk from contaminants at the sites. Contaminants were detected in the surface water, sediment, soil, and groundwater in PGH. Potential receptors of contaminants in surface water and sediment include fish, benthic macro-invertebrates, other aquatic flora and fauna, and some terrestrial faunal

species. Potential receptors of contaminants in soils include deer, rabbits, foxes, raccoons, birds, and terrestrial flora (e.g., Scotch pine, black locust, and oak trees) and fauna.

An extensive, site-wide monitoring and risk-assessment effort was conducted at the MGN site in 1995. The purpose was to investigate all known potential risk sources, including abandoned ponds, removed underground tanks, and material storage areas. From this effort, a few small-scale remediations were performed in order to reduce risks to human and ecological receptors to acceptable levels.

Wetlands, benthic macro-invertebrate, fisheries, herptofauna, avifauna, small mammals, terrestrial vegetation, and threatened and endangered species surveys of the MGN site were conducted in late summer 1992. The cultural resources investigation was conducted in fall 1992. A review of pertinent regulations, technical reports, and documents related to the MGN site was conducted to characterize the remainder of resources at the MGN site. Climate, air quality, geology, sediment, storm-water, land-use, and human health and safety data were obtained from studies conducted in 1990, 1991, 1992, and 1993.

2.11.1 Endangered Species Act

Steps were taking to ensure NETL is in compliance with the Endangered Species Act (ESA). The following agencies were contacted for information on threatened and endangered species on and adjacent to the PGH site:

Pennsylvania Department of Environmental Protection
U.S. Fish and Wildlife Service
Pennsylvania Game Commission
Pennsylvania Fish and Boat Commission.

The United States Fish and Wildlife Service (FWS) maintains a list of Federal endangered and threatened species of animals. The FWS responded on December 14, 1994, that, except for transient species, no Federally listed or proposed threatened or endangered species under FWS jurisdiction are known to exist at the PGH site.

The Pennsylvania Fish and Boat Commission, Bureau of Fisheries and Engineering (PFBC) was contacted for information on Pennsylvania's state endangered and threatened species of fish, amphibians and reptiles. The PFBC responded in a letter dated December 6, 1994, that none of the fishes, amphibians, or reptiles the PFBC lists as endangered or threatened are known to occur at or in the immediate vicinity of NETL PGH site.

The Pennsylvania Game Commission (PGC) Bureau of Wildlife Management has jurisdiction over wildlife and wildlife habitats in Pennsylvania. The PGC responded in a letter dated December 7, 1994, that except for transient species, no state listed threatened or endangered species under PGC jurisdiction are known to exist at NETL PGH site.

The Pennsylvania Natural Diversity Inventory (PNDI) is maintained by the PaDEP Bureau of Forestry, with technical assistance from the Nature Conservancy and the Western Pennsylvania Conservancy. The PNDI contains information on rare, endangered, and threatened animals and plants; exemplary natural communities and special geologic features; and other natural features of Pennsylvania. No response has been received from this agency to date. However, a 1992 response indicated that no confirmed resources of special concern were identified within the study area.

No threatened or endangered species were identified at the PGH site during a terrestrial and aquatic ecological study conducted in 1981. Pursuant to the information received from those agencies contacted, it was determined that no threatened and endangered species were suspected of inhabiting the site.

The following were contacted for information on threatened and endangered species on and adjacent to the MGN site:

Natural Heritage Program of the West Virginia Division of Natural Resources (WVDNR)
U.S. Fish and Wildlife Service
West Virginia University
Marshall University Department of Biological Sciences

The U.S. Fish and Wildlife Service-WV Field Office, the WVDNR Natural Heritage Program, and other sources listing critical habitat characteristics were consulted. Information obtained from these sources indicated that there is no documentation of rare, threatened, or endangered species in the vicinity of the NETL site in MGN, WV. In addition, the WVDNR Wildlife Resources Section knew of no rare species surveys conducted in the MGN facility area. A survey and delineation of threatened and endangered species habitats near the MGN facility was to be conducted if these species were suspected of inhabiting the MGN site. Optimal habitat survey periods would encompass the normal growing season (i.e., May through September). Pursuant to the information received from the agencies contacted, it was determined that no threatened and endangered species inhabited the site.

2.11.2 National Historic Preservation Act

The National Historic Preservation Act is not applicable to the NETL sites. NETL has evaluated all potential landmarks at each site and determined that there are no historically significant landmarks that require preservation.

2.11.3 Migratory Bird Treaty Act

The Migratory Bird Treaty Act is not applicable to the NETL sites. NETL did not take any actions in 2002 that had, or was likely to have, a measurable negative effect on migratory bird populations. No migratory birds of any species were intentionally taken during the conduct of any program, activity, or action, including but not limited to banding, marking, scientific collection, taxidermy, and depredation control.

2.12 Executive Orders

2.12.1 E.O. 13148, "Greening the Government Through Leadership in Environmental Management"

E.O. 13148, "Greening the Government through Leadership in Environmental Management," focuses on integrating environmental accountability into agency day-to-day decision-making and long-term planning processes. The order establishes goals in the following seven areas: (1) Environmental Management Systems; (2) Environmental Compliance; (3) Right-to-Know and Pollution Prevention; (4) Reduction in Toxic Chemical Releases; (5) Reduction in Toxic Chemical, Hazardous Substance, and Other Pollutant Use; (6) Reduction in Ozone-Depleting Substances; and (7) Environmentally Beneficial Landscaping.

Environmental Management Systems

NETL has adopted ISO 14001 as the basis of its EMS and has assessed its environmental programs and activities in order to establish its "top ten" significant environmental aspects. Twenty-one environmental objectives have been established to address those aspects. In addition, corresponding environmental targets and Environmental Management Plans (EMPs) were developed to implement the objectives.

NETL's environmental policy, signed April 25, 2001, continues to be implemented using an acronym known as PRISM, which stands for **P**ollution Prevention, **R**egulatory Compliance, **I**mproving Continually, **S**afety Analysis and Review Systems, and **M**inimization of Waste. The last three letters of the acronym I, S, and M also demonstrate the unique integration of the Environmental Management System (EMS) with integrated safety management (ISM). ISM is based on the theory of "plan, do, check, and act." This is the same approach NETL has taken with its EMS. Environmental objectives and targets are planned and then implemented through EMPs, as well as existing environmental programs. NETL then uses its internal auditing team to validate that employees are effectively working toward EMS objectives and targets. Finally, in those cases where plans and programs are not meeting their objectives, corrective actions are implemented in order to continually improve the system.

Four internal audits of the EMS were conducted in 2002 to assess the status of existing environmental programs and activities. These audits resulted in 74 findings; 48 of the findings were closed in 2002, while 26 remain open. In addition, the EMS Crosscutting Team continued to evaluate NETL's onsite activities using a screening analysis questionnaire (SAQ). For each project, facility, and operation, Crosscutting Team members determined whether specialized training, standard operating procedures, and environmental monitoring/measurement are necessary.

Also in 2002, the EMS representative conducted two hands-on training sessions, introducing the concept of the EMS and ISO 14001 to NETL employees. Subsequently, employees were also provided a computer-based training (CBT) course on ISO 14001 and NETL's EMS, while Crosscutting Team members attended specialized ISO 14001 implementation training.
Two Management Review Team meetings were held in 2002. The first meeting covered the

status of EMS activities, audit results, the internal and external websites, and the EMS Roadmap. The second meeting resulted in the approval of the objectives and targets for fiscal year (FY) 2003.

Communication activities included the publication of seven articles related to ISO 14001 in NETL's internal newsletter, *Plugged In*. In addition, all employees received a mouse pad for their computer, describing NETL's environmental policy and listing the lab's ten significant environmental aspects. A Community Interest Group meeting held at the MGN site provided an opportunity to discuss the environmental impacts of a new building being constructed, and to introduce community members to the concept of ISO 14001certification.

Environmental Management System (EMS) Compliance

EMS compliance with E.O. 13148 includes both the results of the EMS audits and the results of implementing pollution prevention activities. NETL conducted four internal audits of its EMS in 2002 and implemented a variety of pollution-prevention related tasks.
The February Audit (No. 2) addressed all elements of the ISO 14001 Standard and focused on employee awareness of the EMS. Five findings of nonconformance and two points of concern were identified in the areas of Training, Awareness, and Competence; Document Control; Operational Control; and Communications.

In May, Audit No. 3 was conducted. It also addressed all elements of the ISO 14001 Standard; however, it was primarily aimed at Line Management. Three findings of nonconformance and one point of concern were identified in the areas of Communications; Document Control; Operational Control; and Monitoring and Measurement.

The August Audit (No. 4) focused on areas most likely to be targeted in the certification audit, such as EMPs, Safety and Analysis Review System (SARS), and SAQs. Eight findings of nonconformance were identified in the areas of Document Control; Operational Control; Training Awareness and Competence; Environmental Management Programs; Legal and Other Requirements; Monitoring and Measurement; Objectives and Targets; and Emergency Preparedness and Response.
The November Audit (No. 5) focused on auditing personnel within the ES&H and Site Operations divisions, and credit card holders. Thirty-three finding were identified. The most serious nonconformance dealt with managing EMPs and the performance/awareness of facility/area custodians.

Pollution prevention activities in 2002 focused on the "DOE Secretarial Pollution Prevention and Energy Efficiency Goals," which also became the basis of the waste-related objectives and targets in the EMS. For example, NETL's no. 1 environmental aspect is Waste Generation, Management, and Disposal. Objectives and targets were identified to address this aspect and fulfill the pollution prevention goals.

1. Reduce Non-Hazardous Waste—NETL's target is to reduce sanitary waste from routine operations by 30 percent by 2005 using a 1993 baseline. In 2002, CBT was conducted to increase employee awareness of NETL's requirements on sanitary waste generation. In addition,

NETL's sanitary waste streams were reviewed to better characterize the wastes, with emphasis placed on separating recyclables from the waste stream. NETL has also assessed cafeteria operations to determine if the use of disposable food containers and silverware could be minimized through a dishwasher to sanitize china plates and stainless steel utensils. NETL was able to reduce its non-hazardous waste by 67 percent in FY2002.

In addition, NETL conducted—under the auspices of the DOE Office of Fossil Energy (FE) Headquarters—a Pollution Prevention Opportunity Assessment in December 2002 to investigate the feasibility of reducing the amounts of some of the high quantity/high cost process waste streams. Streams evaluated were construction waste (see item no. 3 below), WWTF sludge, WWTF treated effluent (proposed for) recycling onsite, and solvent-contaminated debris. Emphasis was placed on the purchase of construction materials containing recovered (post-consumer) materials (per E.O. 13101).

2. Non-Hazardous Waste Recycling—The target is to recycle 35 percent of sanitary wastes from all operations by 2005 using a 2001 baseline. In 2002, NETL expanded the number of items capable of being recycled to include plastic beverage containers. In addition, cafeteria operations and practices were reviewed to determine what items can be reused and/or composted onsite. An increase to approximately 51 percent of recycled sanitary waste was accomplished from fiscal year (FY) 2001 to FY2002, surpassing the annual targeted increase of 7 percent.

3. Construction and Demolition Waste Segregation—NETL established a target of segregating 75 percent of all construction and demolition wastes (e.g., concrete, wood, drywall, masonry, metal, asbestos, and lead) for recycling and/or disposal by 2005. While this is not a routinely generated waste stream, the goal was to assess the cost-effectiveness of segregating this type of waste. As construction projects occur, a comprehensive sampling/analysis program is followed to assure proper disposition of project-derived materials as hazardous or non-hazardous wherever practicable. All appropriate waste minimization/recycling procedures are followed.

Right-to-Know and Pollution Prevention

[Note: Please see section 2.2 of this report, Superfund Amendments and Reauthorization Act (SARA) for information on EPCRA as required by E.O. 13148. NETL's pollution prevention goals also include "green purchasing" or "affirmative procurement" activities. These activities are discussed in section 2.12.2, E.O. 13101.]

Based on EPCRA requirements, agencies are required to inform the public and their workers of possible sources of pollution resulting from facility operation. The purpose is to help to reduce or eliminate harm to human health and the environment from releases of pollutants Agencies are also to advance the national policy that whenever feasible and cost effective, pollution should be prevented or reduced at the source. See the section on "Environmental Compliance."

Release Reduction: Toxic Chemicals

Innovative pollution prevention, effective facility management, and sound acquisition and procurement activities can help to reduce a facility's TRI releases, as well as the number of off-

site transfers of toxic chemicals for treatment and disposal. DOE's goal is to reduce these numbers by 10 percent annually, or 40 percent by 2006. Even though NETL does not have a TRI inventory to reduce, two specific significant environmental aspects that coincide with this goal have been identified: Reducing Hazardous Material Procurement, Consumption, Storage and Release, and Improving NETL's Chemical Handling Facility and Its Operations. For each of these aspects, NETL has established objectives, targets, and EMPs, all of which remain a critical part of its EMS.

1. Reducing Hazardous Materials Procured, Received, and Stored—NETL's target is to reduce hazardous material inventories/storage (by the number of line items or containers) by 20 percent by 2005, using a baseline that was established in 2002. Once the baseline number of containers was established, NETL screened its projects and activities prior to startup to determine if non-TRI chemicals/reagents could be substituted for originally specified reagents. In addition, a list was developed that Quantum FACTs, the chemical inventory database, will use to generate the list of onsite TRI chemicals. Also, special approvals were required for all chemical purchases.

2. Reducing Risks to Workers and Environment Associated with the CHF—NETL's objective is to perform facility and process fixes to chemical handling and dispensing facility/operations to lower employee risk levels by 2005. New garage doors were installed on the chemical handling facility (CHF) in 2002.

Use Reduction: Toxic Chemical, Hazardous Substance, and Other Pollutants

As described in the section above, identifying proven substitutes and establishing pollution prevention practices can help to reduce NETL's use of selected toxic chemicals, hazardous substances, and pollutants or its generation of hazardous wastes. DOE's goal is a 40 percent reduction in hazardous wastes (e.g., laboratory chemicals, janitorial chemicals) by 2005, using a 1993 baseline. This goal coincides directly with NETL's EMS objective:

- **Reducing Hazardous Materials Procured, Received and Stored—**NETL's target is to reduce hazardous waste from routine operations 25 percent by 2005, using a 1993 baseline. A site-wide list of usable excess chemicals and equipment located at the NETL CHF was distributed to allow researchers to search the chemical database prior to purchasing new chemicals. In addition, NETL reinstituted Pollution Prevention Opportunity Assessments to determine the potential for reducing/minimizing wastes. The initial assessment resulted in plans for addressing construction waste, providing the Site Operations Division with a list of vendors for purchasing construction materials with recycled content, reducing sludge from the waste waster treatment facility, and reusing treated effluent from the waste waster treatment facility.

Reductions in Ozone-Depleting Substances

By evaluating the present and future use of ozone-depleting substances and maximizing the purchase of and use of safe, cost-effective and environmentally preferable alternatives, facilities can develop a plan to phase-out the procurement of Class I ozone-depleting substances. Based on

DOE's goal of phasing out all nonexcepted uses of Class I ozone-depleting substances by 2010, NETL established the following targets:

1. Retrofit or replace 100 percent of chillers greater than 150 tons of cooling capacity and manufactured before 1984 that use Class I refrigerants by 2005. NETL has two such chillers with a cooling capacity greater than 150 tons. In 2002, NETL developed a plan for an A/E firm to replace one chiller in FY2004 and one in FY2005.

2. Eliminate use of Class I ozone-depleting substances by 2010, to the extent economically practicable, and to the extent that safe alternative chemicals are available for DOE Class I applications. NETL identified all Class I ozone-depleting substances by updating previous surveys, and then determined if an alternative to these substances was available. These Class I ozone-depleting substances will be phased-out beginning in 2003.

Environmentally Beneficial Landscaping

E.O. 13148 requires that agencies strive to promote the sustainable management of Federal facility lands through the implementation of cost-effective, environmentally sound landscaping practices and programs to reduce adverse impacts to the natural environment. NETL has identified Non-Industrial Land Use as one of its ten significant environmental aspects; a corresponding EMP has been developed. A project team has completed a feasibility study, identifying and evaluating the best options for land use and improvement. The study included identifying stakeholders, specific projects, and cost and benefits.

2.12.2 E.O. 13101, Greening the Government through Waste Prevention, Recycling, and Federal Acquisition

E.O. 13101, Greening the Government through Waste Prevention, Recycling, and Federal Acquisition, was established to increase the Federal government's use of recycled products and environmentally preferable products and services. The order requires purchasing EPA-designated items with recycled content to lessen the impact of using virgin raw materials.

Increase purchases of EPA-designated items with recycled content to 100 percent. A comprehensive directive on affirmative procurement with provisions for spot checks of credit-card compliance has been developed for all four sites. Effective in October 2002, NETL revised its online version of the NETL-MGN storeroom catalog to make it more user-friendly. In addition, personnel are now required to obtain all storeroom items, both with and without recycled content, from the MGN warehouse rather than from PGH warehouse items or from offsite vendors. This has resulted in increased control over green purchasing. Items are only obtained from the NIOSH-operated PGH warehouse on an emergency basis. A CBT module is being developed on how to purchase items with recycled content.

2.12.3 Executive Order 13123, Greening the Government through Efficient Energy Management

Site Air Emissions

NETL has developed objectives and targets to help implement E.O. 13123 Greening the Government through Efficient Energy Management. NETL is classified as an Industrial and Laboratory Facility per E.O. 13123, and has selected energy management objectives and targets to be consistent with the requirements of ISO 14001 as follows:

Objectives and Targets

Objective 1: To reduce use of ozone depleting substances.

> **Target:** DOE Target—By year 2005, retrofit or replace 100 percent of chillers greater than 150 tons of cooling capacity and manufactured before 1984 that use Class I refrigerants.
>
> **Target:** DOE Target—Eliminate the use of Class I refrigerants by year 2010, to the extent economically practicable and to the extent that safer alternatives are available.

Objective 2: To reduce generation of greenhouse gases.

> **Target:** DOE Target—Reduce generation of greenhouse gases attributed to facility energy use through life-cycle cost effective measures by 25 percent by year 2005 and 30 percent by year 2010.

Objective 3: To increase use of alternative fuels in vehicles.

> **Target:** DOE Target—At least 75 percent of the light-duty vehicles acquired each year should be capable of using alternative fuels.
>
> **Target:** DOE Target—Usage of alternate fuels in alternative fuels vehicles should increase to 75 percent by year 2005, and 90 percent by year 2010.

Targets Met in FY 2002

Objective 1: To reduce use of ozone depleting substances.

> **Action:** Established a 2002 baseline of 1390 lb of Class I refrigerants.
>
> **Action:** Acquired $222,008 from the Federal Energy Management Program (FEMP) to replace two 225-ton Class I chillers.

Objective 2: To reduce generation of greenhouse gases.

Action: Reduced greenhouse gases by 14 percent, based on the 1990 baseline.

Table 6. Carbon Dioxide (CO_2) Emissions

CO_2 X 1,000 lb	Actual	% Change
1990 emissions	67,443	
2002 emissions	58,904	14%

Objective 3: To increase use of alternative fuels in vehicles.

Action: Acquired 14 alternative fueled vehicles, 10 of which are light duty vehicles. This exceeded the target by 75 percent, with 92 percent of the vehicular fleet being alternative fuel vehicles. Refer to Table 7.

Table 7. Alternatively Fueled Vehicle Acquisition in FY 2002

Vehicular Fleet	Light duty Vehicles	Alternative Fueled Vehicles	Percent acquired Alternative Fuel
15	10	14	92%

Action: The target reduction in annual petroleum consumption for NETL was not met, because of a lack of infrastructure in alternative fuels. Refer to Table 8.

Table 8. Alternative Fuels Use in FY 2002

Annual Petroleum Fuel Consumption Long-term target: Reduce annual petroleum consumption (adjusted for mileage) for NETL's vehicular fleet by 20% by 2005 using 2001 baseline (adjusted for mileage)	
Target	.0351 gallons per mile (5%reduction)
Actual	.0372 gallons per mile (6% increase)

2.12.4 Executive Order 11988, Floodplain Management

Floodplain management is not applicable. NETL sites did not conduct any actions impacting floodplain management in 2002.

2.12.5 Executive Order 11990, Protection of Wetlands

Protection of wetlands is not applicable. NETL sites did not conduct any actions impacting wetlands in 2002.

3 Environmental Program Information

3.1 Introduction

The following is a brief description of the major environmental programs at NETL geared toward assessing and achieving environmental compliance, including site meteorology, monitoring and surveillance, environmental restoration and waste management, and effluent monitoring.

In addition, information on significant environmental activities at NETL not fully covered in other sections is presented here. This includes the site's EMS, directives program, environmental occurrences, facility environmental performance measures, environmental training programs, pollution prevention and waste minimization programs and DOE's (Secretarial) Pollution Prevention and Energy Efficiency Goals (November 1999). Information presented in the Compliance Summary and other sections of this report are not discussed here.

3.2 Site Meteorology

Meteorological data for the PGH site were collected from three separate 33-ft free-standing meteorological towers. Data collection points were at ground level and above ground at 6 and 33 ft. Rainfall data was collected at ground level. Relative humidity, air temperature, and solar radiation were collected at the 6-ft level. Air temperature, vertical and horizontal wind speed, and wind direction were collected at the 33-ft increment. Data collected are stored on computers, located in PGH's B-922 and the $PM_{2.5}$ trailer.

Meteorological data for the MGN site were collected from a 150-ft free-standing meteorological tower. Data collection points are at ground level and above ground at 33, 75, and at 150 ft. The data collected at ground level were air temperature, relative humidity, and total rainfall. The other stations monitor wind direction, wind speed, and air temperature. All data collected are stored on a computer, located in B-33 of the MGN site.

Meteorological data at the MGN and PGH sites were used in modeling for emissions and emergency response. Data was also by NETL's project management through its Power and Environmental Systems experimental $PM_{2.5}$ study.

3.3 Site Monitoring and Surveillance

NETL currently monitors groundwater, storm-water, industrial waste-water, drinking water, meteorological conditions, and air emissions (based on the scope and nature of individual research projects) independently at the onsite research sites in accordance with regulatory

requirements and NETL Operating Plan 450.1-1A, NETL Environmental Media and Release Management.
Limited analyses with regard to total petroleum hydrocarbons (TPH) from several designated groundwater monitoring wells at the PGH site were supplied to the State of Pennsylvania as requested in conjunction with remedial actions for the removal or abandonment-in-place of several underground storage tanks during August 1994. The results were requested by the State and were not provided as the result of any consent agreement or permit requirement. A detailed discussion of groundwater monitoring is presented in Section 7 of this report. All records pertaining to site monitoring and surveillance are maintained in a centralized records management system.

Storm-water discharges at NETL facilities are monitored under guidance from the WVDEP and the PaDEP through the NPDES permitting program. Storm-water is monitored in accordance with permit requirements for parameters established by the respective states based on historical concerns. Discharge monitoring reports are submitted annually at MGN and quarterly at PGH (with the exception of the treated acid mine water from the NIOSH Safety Research Coal Mine that is discharged into the storm sewer through Outfall 101, which is monitored weekly and reported monthly) in accordance with permit requirements. As a permitted entity, NETL has prepared a Storm Water Pollution Prevention Plan (SWPPP) in accordance with state and Federal guidelines for preparing pollution prevention plans. The SWPPP is updated annually and controlled copies are maintained at the MGN and PGH sites.

Industrial waste-water discharges at NETL facilities are monitored under guidance from the Morgantown MUB and the PHA through the EPA-administered pretreatment program. Industrial waste-water is monitored in accordance with permit requirements for parameters specified by the governing regulatory authority. Discharge monitoring reports are submitted monthly at MGN. In PGH the monitoring results are submitted semiannually in accordance with pretreatment permit requirements. PHA has also requested that the effluent from PGH's WWTF be monitored and reported monthly; however, this is not pursuant to any consent agreement or permit requirement. NETL industrial waste-water pretreatment systems are operated in accordance with approved standard operating procedures and NETL environmental, safety, and health (ES&H) policies.

Although not required, NETL monitors drinking water under SDWA auspices. Since NETL does not own or operate a public water system, regulation under the SDWA not apply; however, the MGN and PGH sites periodically monitor drinking water at selected locations and compare the results to the primary and secondary drinking water standards delineated under the Act as a best management practice. None of the monitoring results would have violated the primary or secondary drinking water standards during 2002. All monitoring results are maintained in the centralized records management system. The most recent results for each sampling location are posted and maintained at that location as public information.

Compliance with applicable ambient air quality requirements at NETL facilities is maintained in accordance with Federal, state, and local regulations and NETL Procedure 450.1-1, NETL Ambient Air Quality Management. Air emission estimates are generated and maintained for all projects and operations at the MGN and PGH sites. An annual air emissions inventory is prepared for each site and is submitted to the governing regulatory agency as required. The emissions estimated for the MGN and PGH sites indicated no significant changes in status from

the previous year. The Certificate to Operate MGN's SynGas Generator/Hot Gas Desulfurization (HGD) PDU was appropriately maintained. This Certificate to Operate is issued through the WVDEP Office of Air Quality. Compliance with the CAA Title V exemption was maintained in PGH through the summary of collected air emission estimates from all processes and projects on each site.

Meteorological conditions are monitored at the MGN and PGH sites in accordance with NETL Procedure 450.1-1, NETL Ambient Air Quality Management, through the collection of real-time data obtained by means of free-standing meteorological monitoring towers and associated sensors and instrumentation. Air temperature, relative humidity, rainfall, wind direction, wind speed, and solar radiation are measured and archived on electronic media. The data are readily available for various uses, including project operations and planning, air dispersion modeling, and emergency response efforts if necessary.

3.4 Effluent Monitoring

The PGH and MGN sites monitored surface-water discharges consisting of industrial waste-water effluent from the clarifier in MGN, industrial waste-water effluent from PGH's WWTF, and storm-water discharge from the MGN and PGH sites.

Surface water effluent from the 69-acre PGH site discharges into Lick Run - a small natural stream that flows along the eastern boundary of the 238-acre, three agency Bruceton Research Center. Contributions to the PGH storm-water effluent are regulated by a NPDES storm-water discharge permit and consist of air conditioning condensate, runoff from various impervious surfaces into the site storm sewer, and treated acid-mine drainage from a safety research coal mine operated by NIOSH. Monitoring results can be found in Table 10 in the appendix.

Surface water effluent from the 132-acre MGN site discharges into Burroughs Run and West Run, tributaries of the Monongahela River. Effluent is composed only of storm-water runoff from buildings, parking lots, and developed and undeveloped areas. Three outfalls are required to be monitored by the NPDES storm-water discharge permit. Monitoring results can be found in Table 10.

The MGN site monitored its industrial waste-water effluent according to a permit issued by the Morgantown MUB. Industrial waste-water included non-contact cooling water, non-contact process cooling-water overflow, boiler blow-down, laboratory sink, laboratory floor drains, and motor pool waste-water. Monitoring results can be found in Table 11 in the appendix. The PGH site monitored its laboratory/process waste-water according to a permit issued by the PHA. Monitoring results can be found in Tables 11 and 12.

3.5 Other Environmental Issues and Actions

3.5.1 Directives Program

The directives process uses total quality management principles to identify and implement standards that adequately protect workers, the public, and the environment. The primary objective of the process is to identify or develop a set of directives that, when implemented, provides consistency and reasonable assurance that the health and safety of the workers, public, and the environment will be protected during the performance of the work.

Although this process is not expected to be completed until 2003, NETL continued in 2002 to develop new directives and perform annual reviews of existing directives. New directives prepared include the ES&H Management Support Program Operating Plan that addresses the implementation of the Integrated Safety Management System (ISMS) at NETL. NETL also developed new ES&H management procedures that cover the processes used to integrate ES&H aspects into the management of contracts and awards. Other new ISO 14001-related procedures included Process for Identifying and Maintaining Environmental Aspects, Environmental Objectives and Targets, and EMPs; Calibration and Maintaining of Instruments that Monitor and Measure Key Environmental Characteristics; and Monitoring and Maintaining Key Environmental Characteristics. Existing operating plans and procedures that were revised included: the Waste Management Program; the Groundwater Management Program; and the Surface Water program.

Directives receive a rigorous internal review by all internal stakeholders prior to final approval by senior management. Directives will be reviewed each year for the first 3 years and then every 3 years thereafter. Reviews can occur more frequently if a change in regulations or site conditions occurs. Official copies of the directives are accessible through NETL internal intranet website.

All ES&H directives (these are procedures that detail site program requirements including responsibilities) and EMS (ISO - Environmental Management System) documentation may be accessed through the NETL internal intranet website. Copies of directives that are not accessed on the intranet are considered uncontrolled documentation, as the only means to ensure the use of the most current copy is to view it electronically. NETL employees are trained and aware of this practice.

The significant environmental impacts of employee work activities and the environmental benefits of improved personal performance are communicated through the NETL intranet webpage, CBT and lecture-based training, and quarterly EMS audits (the auditees are asked which environmental aspects are affected by their daily activities, and what are the aspects that have been identified for NETL). Employees are also required to know (a) their roles and responsibilities in achieving conformance with the environmental policy, (b) site procedures, and (c) requirements of the environmental management system, including emergency preparedness and response. During audits, employees are asked to respond to questions concerning the consequences of their non conformance with site policy and procedures (as applies to environmental aspects).

In 2003, quarterly audits will continue and further screening will be implemented to collect project information relevant to ISO 14001.

3.5.2 Environmental Occurrences

Notification of environmental occurrences is required by DOE and under a number of Federal, state, and local environmental statutes and regulations. NETL Procedure 151.1-2, Occurrence Categorization and Reporting, implements these DOE reporting requirements and complies with state and local statutes.

DOE Order 232.1A provides guidelines on categorizing and reporting environmental occurrences to DOE. The order divides occurrences into three categories: emergencies, unusual occurrences, and off-normal occurrences. At the MGN and PGH sites, an onsite emergency response organization (ERO) is in place and responds 24-hours a day. The ERO cleans up or mitigates small spills. If larger spills occur, offsite assistance is used as needed. Once an incident occurs, the ERO is responsible for categorizing the incident, notifying the proper regulatory agencies, and completing the DOE occurrence reporting.

NETL reported eight occurrences during 2002. Six occurrences were environmental in nature:

- On January 17, 2002, a natural gas line ruptured offsite from the MGN site, which resulted in an undetermined amount of natural gas being released to the atmosphere. Because of the presence of this gas migrating onto NETL property, an operational emergency was declared and the HVAC systems to several buildings were shut down. All site employees were alerted to the potential danger and advised to remain inside buildings. Onsite emergency response personnel performed air monitoring activities to determine whether explosive levels of methane were collecting or whether there were levels hazardous to employee health. Measured levels were below these levels.

- On July 22, 2002, a liquid nitrogen leak on a cryogenic system resulted in a gas release to the atmosphere at the MGN site. A failed compression fitting resulted in the nitrogen gas leakage. The area around the tank was monitored continuously until the gas supplier completed repair operations. Monitoring during the release indicated safe levels of oxygen. Noise levels were monitored and were approximately 80 dBA at the nearest area where employees were working.

- An NOV from the PHA was received for exceeding waste-water discharge limits at the PGH site on August 14, 2002. The NOV alleged that NETL exceeded the allowable discharge concentrations of free cyanide into the sanitary sewer system on July 09, 2002. The discharge from this waste-water is covered by NETL Industrial Sewer Use Permit. Analysis of the WWTF sample indicated a cyanide concentration of 0.023 mg/L, which exceeds the allowable discharge limit of <0.005 mg/L. To mitigate further occurrences, NETL completed several improvements at this facility aimed at improving the quality of the waste-water discharge.

- On September 17, 2002, an underground fire water supply line for building fire suppression sprinkler systems at the PGH site ruptured. Water from this system leached up through the near-surface and surface soils adjacent to the broken line and subsequently flowed into the nearby storm sewer catch basin. Turbid water with a pH of 8.5 (laboratory measurement)—the result of passing through a subsurface limestone layer—subsequently flowed into Lick Run through the permitted Bruceton Research Center North Outfall. The fire water-supply system was isolated. Operations with a potential fire risk were discontinued until sprinkler systems were restored to normal operation. This incident caused negligible impact to the environment from the introduction of soil sediment into the storm-water system.

- A water quality violation took place on October 8, 2002 at the PGH site. On November 20, 2002, the PHA issued NETL an NOV based on findings on the quality of the waste-water discharge. The discharge limits are established in Section V, Discharge Permit Requirements of the Industrial Sewer Use Permit. The NOV noted that NETL had failed to meet local limits for waste-water discharge for mercury. Analysis of the WWTF treated effluent sample indicated a mercury concentration of 0.00081 mg/L, which exceeds the allowable discharge limit of <0.0002 mg/L. To mitigate further occurrences, NETL completed several modifications aimed at improving the quality of the waste-water discharge.

- A waste-water discharge incident occurred on October 31, 2002 at the PGH site. On November 20, 2002, the PHA issued NETL an NOV based on findings made on the quality of the waste-water discharge. The discharge limits are established in Section V - Discharge Permit Requirements of the Industrial Sewer Use Permit. The NOV noted that NETL had failed to meet local limits for waste-water discharge for cyanide. Analysis of the WWTF treated effluent sample indicated a cyanide concentration of 0.088 mg/L, which exceeds the allowable discharge limit of <0.010 mg/L. NETL has performed several modifications to the WWTF aimed at improving the quality of the waste-water discharge.

3.5.3 Environmental Performance Measures

A formalized approach to performance measurement continued throughout 2002 as part of an effort to address performance requirements, such as those mandated by the Government Performance and Results Act. This approach included measurement elements covering management of ES&H risks associated with implementing organizational missions. Goals and objectives for ES&H activities were established and specific performance targets addressing ES&H risks were included for measurement. Refinements of ES&H strategies and specific targets to meet the goals and objectives for 2002 were made, based on performance results from 2001 and changing organizational initiatives.

Environmental performance measures at NETL included the following:

1. Tracking the number of environmental occurrences (such as permit excursions),
2. The amount of hazardous wastes being generated,

3. The quantity of regulated waste-water effluent discharged,
4. The quantity of air emissions discharged, and
5. The successful implementation of activities required to attain ISO 14001 certification.

Measures are tracked for the Assistant Secretary's Pollution Prevention goals, and completion of ISO objectives and targets. Performance generally improved for NETL in 2002 when compared to previous years.

3.5.4 Environmental Training Programs

NETL continued provided ongoing environmental training during 2002. New employees were required to complete the EMS/ISO 14001 course that had been offered to the NETL general population in 2001. In addition, all other required ES&H courses including Hazard Communication (HAZCOM) and Waste Minimization/Hazardous Waste/Recycling were provided. Employees that became Contracting Officer's Representatives (CORs) were required to complete the ISM for CORs course to promote awareness of ES&H requirements for onsite and offsite work.

Ongoing ES&H training required by regulation such as Hazardous Waste Operations and Emergency Response (HAZWOPER) and Hazardous Waste Handlers was provided.

Based on a series of internal ISO 14001 audits, the previously offered EMS/ISO 14001 CBT module was reworked to address knowledge gaps and to reinforce key points of the ISO 14001 implementation effort. This revised course is slated for release to all employees in 2003.

The ES&H Training Tracking database was modified to track all ES&H training, including small-group training in an effort to locate all ES&H training records for NETL at a single location. Previously ES&H group training and small-group specialized training were recorded in several places by different groups.

Identification and documentation of operational training for R&D projects and plant work activities were established and a tracking system was developed to help ensure adequate operational knowledge associated with identified duties. This process supports the Support Operations System and the R&D SARS, as well as the requirements of ISO 14001.

3.5.5 Pollution Prevention and Waste Minimization Program

Recycling of wastes and minimization/prevention of waste generation is an integral part of NETL's pollution prevention/waste minimization program.

NETL-PGH is mandated to recycle by the State of Pennsylvania under Pennsylvania Act 101-Municipal Waste Planning, Recycling, and Waste Reduction Act. The MGN site is not required to recycle by West Virginia regulations, but is required to comply with Federal executive orders.

All four sites maintained recycling programs, and the following inherently non-hazardous items were recycled whenever possible: office wastes (mixed paper, newspapers, magazines, and toner cartridges), scrap metal, aluminum beverage containers, corrugated cardboard, and telephone books. In addition, used motor oil was recycled offsite for re-refining and subsequent reuse. Some process solvents were placed into fuels blending programs for beneficial reuse as fuels. Batteries (lead-acid, dry-type, other) are sent to the appropriate recycling facility by the NETL hazardous-waste-disposal contractor. Vehicle tires were sent offsite for use as fuel or for use in a shredded rubber reuse process. Wooden pallets are placed into the recycle stream for reuse as pallets or landscape mulch. Used fryer oil from the MGN cafeteria is collected by an offsite vendor for recycling.

Toner cartridges are sent offsite to a vendor who refills them and returns them to NETL. The cartridges are kept out of the waste stream and the cost for refilling is lower than the cost for new replacements. This procedure not only saves money, but also helps NETL meet affirmative procurement requirements.

In addition, process-related or -derived materials (both raw materials and non-hazardous waste products), such as unused waste coal or process-generated fly ash, were reclaimed whenever possible for beneficial use as raw materials useable in an offsite process (e.g., boiler fuel or cement, respectively).

3.5.6 Clean Water Action Plan

The Clean Water Action Plan is not directly applicable to NETL. NETL sites did not conduct any actions impacting watersheds with critical water quality problems in 2002.

4 Environmental Management Information

NETL sites are staffed by ES&H professionals who reviewed activities to ensure that the sites comply with environmental laws and regulations. All onsite research projects and support activities were reviewed by ES&H staff, in conjunction with the SARS, for possible impacts on air, surface water, groundwater, and soil. Applicable Federal, state, and local regulations potentially affecting these activities are reviewed and compliance is ensured before approval by the ES&H staffs.

A Pollution Prevention Assessment was conducted in 2002 and the final report was issued in January 2003. This report was performed in cooperation with FE ES&H staff. The purpose of the assessment was (a) to identify additional opportunities to reduce or eliminate problematic waste streams from various site activities, and (b) to lower overall waste disposal costs. A number of recommendations were made that will be considered for future implementation.

The Secretarial Pollution Prevention goals were met for hazardous waste reduction and recycling. Hazardous wastes for FY 2002 were reduced by 53 percent from FY 2001 (the Federal fiscal year runs from October 1 to September 31 of the next year). In FY 2002, a 92-percent reduction in hazardous wastes occurred from the 1993 baseline. Over 50 percent of sanitary waste was recycled during FY 2002. NETL is an R&D laboratory, and does not typically produce a consistently routine hazardous waste stream, which has made the calculation of return on investment difficult. However the site does attribute the reduction of waste to several initiatives currently being conducted: reducing the acid/caustic lab waste stream by treatment in the onsite waste-water treatment system, increased segregation of universal waste streams, such as lead/acid batteries and fluorescent light tubes for recycling; and use of an onsite chemical inventory tracking system that allows personnel to search for chemicals in an existing storage area before purchasing new chemicals.

Integrated Management Activities

NETL continued pursuing the objective of ISM to integrate ES&H into work processes and practices by DOE and its contractors throughout 2002. An essential quality of ISM is continuous improvement. A number of continuous improvement activities were undertaken to enhance and better define NETL's approach to ISM.

A team representing R&D management, researchers, operating technicians, and the ES&H Division was formed to revise the R&D SARS. The goals of this team were: to create a more structured approach to SARS review; to enhance the quality of the safety analysis process; and to ensure better information was available to management for assessing risks and mitigation of the R&D work. NETL used an ISMS verification process, the ISO 14001 implementation process, and experience gained from the SARS process to identify opportunities for improvement. Two major changes were made to the safety analysis process: (a) a Project Quality Assurance Engineer (PQAE) from the Engineering Applications and Operations Division was added to the review process, and (b) data gathering for ISO 14001 was incorporated into the process. The PQAE is a consultant on engineering, quality assurance, and conduct of operations issues. The

PQAE also serves as an assessor of documentation, design, analysis, and operations to ensure that the proper process is being followed by all R&D activities. These two areas led to enhancements in operational and document control through improved management of operating procedures, more inclusive documentation of process steps, enhanced operational training, better definitions of environmental aspects and potential environmental impacts, better review of engineering designs, and a more structured hazard analysis process. The new R&D SARS process is being reviewed and is slated for release in early 2003.

Other continuous improvement activities included (a) continued work on directives to integrate and improve the ES&H aspects of work processes, (b) updating the NETL Functions, Roles, and Authorities Manual (FRAM); and (c) updating many of the contractors' ISM plans. The Assessment Input Information System (AIIS), a computerized system for communicating and tracking ES&H concerns and findings, has been expanded to allow for its use by NETL site-support contractors. Contractors can now use the established system, and can provide additional data for trending ES&H issues.

Members of NETL DOE and contractors management teams attended DOE ISMS workshops and conferences in May, August, and December to share experiences and look for opportunities to improve the ISMS program at NETL.

The implementation of ISO 14001 requirements in preparation for certification in 2003 has represented a major effort. The integration ISO/EMS with ISM has served to enhance and reinforce the core functions and guiding principals of ISM at NETL. (NETL's ISO/EMS effort is described in detail in Section 2.12.1 of this report.)

5 Environmental Radiological Program Information

The Atomic Energy Act (AEA) of 1954 and its amendments are the Federal laws that mandate DOE control of radioactive materials in order to protect public safety and health. DOE orders, EPA regulations, and Nuclear Regulatory Commission (NRC) regulations are based on the AEA. Under the amended AEA, DOE is responsible for establishing and maintaining an environmental, health, and safety protection program to control radioactive materials. Furthermore, although DOE facilities are generally exempt from NRC regulations, the facilities are expected to meet the intent of these regulations.

NETL does not generate, transport, process, treat, or have onsite permanent disposal of any radioactive waste. However, NETL uses research instrumentation that contains radioactive sources. Also, four phosphorescent exit signs are used in the MGN site's hazardous waste facility. An inventory of radiation sources was maintained by the radiation safety officer, indicating the item, isotope, quantity, custodian, location, status, and activity. Table 9 (on the next page) lists the 2002 source inventory. NETL did not release any radionuclides into the environment, as all of its sources are sealed and are used in instrumentation.

The radiation monitoring performed at NETL consisted of a limited number (less than 20) of personal dosimeter badges and rings supplied under a contract with Radiation Detection Company. In addition, leak testing and analysis at the MGN and PGH sites were conducted on all applicable sealed sources by Applied Health Physics.

Table 9. NETL Radioactive Materials Inventory for 2002

Isotope	Quantity	Activity	Supplier/Source	Location
Po-210	4	Consumer Product	Anti-Static Brushes	PGH
Cs-137	3	40 mCi (2); 20 mCi (1)	Ronan Engineering Company, Model 137; Level Density Gauge	PGH
Cs-137	4	30 mCi (3); 6 mCi (1)	Berthold Systems, Inc. Model LB-7400D; Level Density Gauges	PGH
Assorted	80	Consumer Product	Smoke Detectors	PGH
Ni-63	1	15 mCi	Gas Chromatograph Electron Capture Device	PGH
Kr-85	1	2 mCi	Model No. 3077; Serial No. 700T; Thermo-Systems, Inc.	MGN
Kr-85	1	2 mCi	Model No. 3012; Serial No. 467T; Thermo-Systems, Inc.	MGN
Kr-85	1	2 mCi	Model No. 3012; Serial No. 626T; Thermo-Systems, Inc.	MGN
Kr-85	1	2 mCi	Model No. 3077; Serial No. 373T; Thermo-Systems, Inc.	MGN
Kr-85	1	2 mCi	Model No. 3077; Serial No. 697T; Thermo-Systems, Inc.	MGN
Ni-63	1	15 mCi	Model No. 6000204; Serial No. 533; Perkin-Elmer Corporation	MGN
Sc-46	1	0.065 mCi	University of Missouri; *Source encapsulated by a nylon bead.	MGN
Sc-46	1	0.046 mCi	University of Missouri; *Source encapsulated by a nylon bead.	MGN
Ra-226	1	9 µCi	Model No. B-5; Serial No. 11205; Mettler Corporation	MGN
Ra-226	1	21 µCi	Model No. —5; Serial No. 17032; Mettler Corporation	MGN
Phosphate Rock	1	Consumer Product	Model No. 1080; Sun Nuclear Corporation	MGN
Ra-226	1	9 µCi	Model No. B-5; Serial No. 13805; Mettler Corporation	MGN
H-3	1	20 Ci	Model No. B100/U10; Serial No. 575263; SRB Technologies	MGN
H-3	1	20 Ci	Model No. B100/U10; Serial No. 574434; SRB Technologies	MGN
H-3	1	20 Ci	Model No. B100/U10; Serial No. 574435; SRB Technologies	MGN
H-3	1	20 Ci	Model No. B100/U10; Serial No. 574436; SRB Technologies	MGN
Co-57	1	12 mCi	Model No. IPL CUS; Serial No. EE661; Isotope Products Lab	MGN
Cs-137	1	1 µCi	Tele-Atomic, Inc.;	MGN
Cs-137	1	10 µCi	Tele-Atomic, Inc.	MGN
Ba-133	1	1 µCi	Tele-Atomic, Inc.	MGN
Ba-133	1	10 µCi	Tele-Atomic, Inc.	MGN
Tl-204	1	1 µCi	Tele-Atomic, Inc.	MGN
Tl-204	1	10 µCi	Tele-Atomic, Inc.	MGN

6 Environmental Non-Radiological Program Information

The non-radiological monitoring program at NETL was designed to meet permit requirements, and to assess the effectiveness of ongoing waste minimization and pollution prevention programs. The 2002 monitoring program focused on industrial waste-water, storm-water, groundwater, hazardous waste, and soil. NETL sites are not required and did not perform specific air-emissions monitoring based on permit requirements. However both the PGH and MGN sites prepare annual air emission inventories. PGH prepares its air emissions inventory as part of its Title V permit requirement. MGN reports information on hours of PDU operation to the WVDEP on a quarterly basis. Specific monitoring and permit information is in Section 2.4 of this report.

6.1 Clarifier Effluent Monitoring

The PGH site's treated laboratory and process waste-water effluent (from the north half of the site only) is discharged into the sanitary sewer separately from the "domestic" sanitary waste-water. The primary objective of the industrial waste-water monitoring program is to comply with the Pleasant Hills, Pennsylvania, POTW pretreatment requirements.

Laboratory and process waste-water generated at the PGH site are pretreated in the site WWTF for removal of metals and organics prior to discharge into the sanitary sewer (under the auspices of the site's Industrial Sewer Use Permit). Prior to construction of the WWTF in 1985, these waste-water streams were discharged into the sanitary sewer or Lick Run. A separate collection sewer system was designed and built as part of the WWTF construction program. An extensive drainage system survey and re-routing effort took place to ensure that all facility drainage systems carrying non-sanitary (domestic) sewage were re-routed into the WWTF collection sewer. Subsequently, dye testing was performed on drains where the routing was unknown or suspect, and appropriate corrective actions (re-routing or plugging) were taken where incorrectly routed drains were discovered. Dye testing was also performed on new construction to confirm that new drains were properly routed.

The MGN site was permitted by MUB to connect to the city's POTW and was required by that permit to conduct monthly monitoring of the clarifier effluent. The waste-water was treated to adjust the pH, if necessary to meet the permit limitation. Clarifier effluent monitoring parameters and sampling results are presented in the appendix. Tables 11 and 12 in the appendix contain industrial waste-water effluent data for NETL sites.

6.2 Storm-Water Monitoring

The primary objectives of the storm-water discharge monitoring program are to comply with a multiple Federal party (NETL, NIOSH, and Mine Safety and Health Administration [MSHA]) NPDES storm-water discharge permit at the PGH site, and a general storm-water discharge permit at the MGN site. PGH's NPDES permit requires both quarterly (outfalls 001 and 002 are reported quarterly) and weekly sampling and reporting (outfall 101, treated acid mine water, sampled weekly and reported monthly). MGN collects and reports on samples taken semiannually. PGH storm-water flows to Lick Run and ultimately to the Monongahela River. MGN storm-water flows to Burroughs Run and West Run, and ultimately to the Monongahela River. Table 10 contains monitoring data related to storm-water discharges for NETL's sites.

6.3 Waste Minimization

NETL hazardous waste-generation rates for the past 8.5 years have been, for the most part, significantly lower than the rates of prior years. The decrease is partially reflective of several waste-minimization efforts and initiatives instituted over that time period. However, quarterly hazardous waste-generation rates at the MGN site have historically exhibited wide variations, since they depend on many complex factors. These factors include project schedules and operational activities, facility management and maintenance activities, responses to various audits or assessments (e.g., corrective action plan response to the tiger team assessment), the R&D nature of the facility, and significant management initiatives.

Monitoring the generation of hazardous and non-hazardous wastes allowed NETL to assess the effectiveness of its waste minimization program. Reducing or minimizing the waste generated decreased waste management needs (e.g., onsite housing, transportation, and disposal needs), thereby reducing the cost, environmental impact, and liability of such operations.

Employees are required to determine the feasibility of utilizing less hazardous reagents in their research wherever feasible. In addition, employees are required to obtain chemicals from the site's inventory where possible. If existing inventory is not sufficient, purchase of new chemicals in the smallest amounts possible is encouraged to minimize waste disposal and/or storage requirements.

The site waste disposal contractor is required to find out-sources for recycling wastes where the technology is available rather than to dispose of these wastes.

At the PGH site, waste inorganic laboratory acids and caustics (uncontaminated by other hazardous substances) are neutralized in the site WWTF, a practice permitted under RCRA/PaDEP, which does not require a permit for treatment, storage, or disposal.

NETL has instituted a practice of sending used toner cartridges to an offsite vendor who refills the cartridges and returns them to NETL, charging only for the cost of refilling the cartridges.

This practice minimizes the necessity for purchasing replacement cartridges, either new or remanufactured. This practice has saved approximately $40,000 per year since its inception.

E.O. 13148 requires the retrofit or replacement of 100 percent of chillers greater than 150 tons of cooling capacity and manufactured before 1984 using Class I refrigerants by 2005. NETL has two such chillers with a cooling capacity greater than 150 tons and a funding request in FY 2001 was submitted to the FEMP to replace these chillers. Replacement of these chillers by 2005 will depend on availability of funding and budgetary restraints.

In addition, NETL plans to identify all Class I ozone-depleting substances (ODS) by updating previous surveys, and then determine if an alternative to these substances is available. A plan will be developed to eliminate all Class I ODS by 2010 to the extent economically practicable. To date, small class I ODS appliances (e.g., water coolers) are changed out as problems arise.

Pollution Prevention Opportunity Assessments (PPOAs) have been used to determine the feasibility of reducing the amounts of waste generated. Three waste-reduction approaches were considered: process modification, waste recycling, and waste reuse. The assessment evaluated the following waste streams: WWTF sludge; WWTF discharge; solvent-contaminated debris; construction debris; and combustion-research-derived fly and bottom ash. The assessment resulted in a report with goals and objectives that are to begin implementation in 2003.

7 Site Hydrology, Groundwater Monitoring, and Public Drinking-Water Protection

In September 1985, the Secretary of Energy announced a series of initiatives designed to strengthen the ES&H programs and activities within DOE. As required by Chapter III of DOE Order 5400.1, General Environmental Protection Program, NETL developed groundwater protection management programs at the two sites. The purpose of the order was to establish environmental protection requirements, authorities, and responsibilities for DOE operations; and to ensure compliance with applicable Federal, state, and local environmental laws and executive orders and DOE policies. The intent of DOE 5400.1 and the groundwater protection management program was to ensure that facility RCRA and CERCLA actions were addressed. Based on activities conducted at the sites, NETL was not subject to groundwater monitoring requirements as set forth under RCRA and CERCLA.

7.1 Site Hydrology

7.1.1 PGH Site

General Geology Related to the Site

NETL's PGH site (Figure 1) is located within the Appalachian Plateau physiographic province. The topography, consisting of rolling hills and ridges, is the result of dendritic drainage erosion of the uplifted Allegheny Peneplain.

All rocks in the area are of sedimentary origin. They are almost exclusively Pennsylvanian or Permian in age, with the exception of alluvium in the stream and river valleys which is Quaternary. At the Bruceton location, bedrock is Pennsylvanian and belongs to the Monongahela and Conemaugh groups. The contact is identified by the Pittsburgh Coal, which is the bottom-most member of the Monongahela Group. (See Figure 2.)

The Monongahela Group forms the tops of the hills on the site and consists of cyclic and interfingering sequences of shale, limestone, sandstone, and coal. Two prominent coal beds, the Redstone Coal and the PGH Coal, outcrop onsite. The PGH Coal, however, has been heavily mined and very little remains. The resultant mine voids and their possible effect on groundwater are discussed.

The Conemaugh Group is exposed lower on the hills and in the valleys of the site. The upper member of this group is the Casselman Formation, which consists of thinly bedded limestone interbedded with calcareous, variegated shales and sandstone.

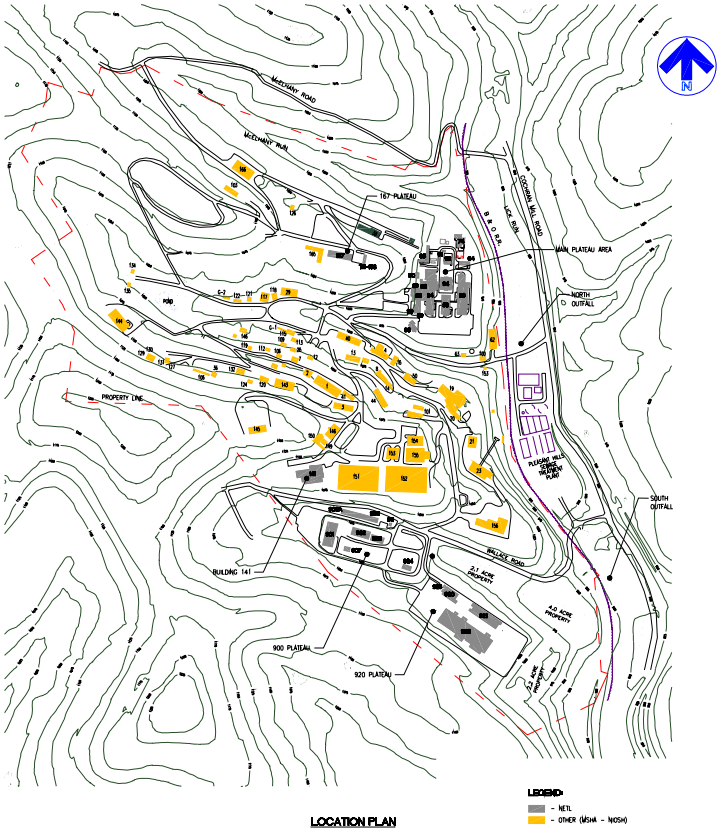

Figure 1. Map of the NETL-PGH Site

In the PGH geologic quadrangle, there are two major anticlines and two major synclines. The axis of one of the anticlines, the Amity Anticline, trends northeast to southwest and passes just southeast of NETL. As a result, rock units under the site dip gently to the northwest at about 10°. Locally, minor folding and faulting also occur.

Site Aquifers

Groundwater in the region is known to occur in unconsolidated deposits in stream valleys and in fractures, pore spaces, bedding planes and solution channels in consolidated rock layers. No water-bearing zones have been encountered in overburden soils during previous drilling on DOE property.

The shallowest aquifer on NETL property is found in the weathered bedrock just below the rock/soil contact and occurs over most of the site, except where it is undermined. Recharge of this unit occurs where rainfall percolates downward into the weathered strata until a continuous horizon of low vertical permeability (unweathered bedrock) is encountered. There are a total of 19 wells screened in shallow weathered bedrock; 7 are located in the Main Plateau area and 12 are in the Valley Fill area.

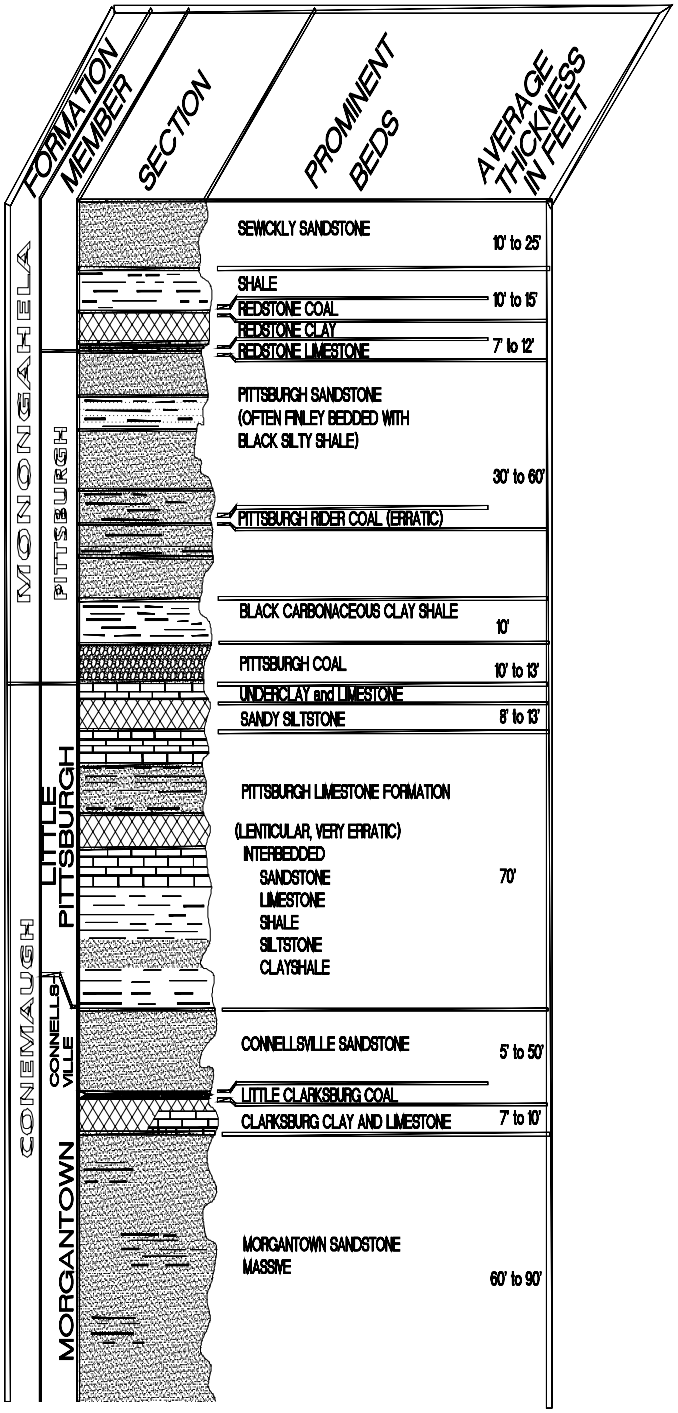

Figure 2. Typical General Geologic Column for the NETL-PGH Site

A deeper water-bearing zone has been noted at the contact between the Connellsville Sandstone and the Clarksburg Clay and Limestone at the NETL-PGH site. Four wells are screened in this deeper zone (located in the Main Plateau area). This deeper aquifer had extremely low yield in the Valley Fill area.

Four wells (2 at the Main Plateau and 2 in the Valley Fill area) were originally screened in the depth interval between the two aquifers, within fractured strata. These wells had extremely low yields and were subsequently abandoned. The minimal amount of groundwater occurring in this intermediate zone is probably the result of leakage from the overlying shallow, weathered bedrock zone.

The PGH Limestone, with its interbedded shales, is generally impermeable except where weathered, fractured, or where bedding-plane passages have been formed by solution. Onsite monitoring wells installed in the PGH Limestone formation have had highly variable water production. Weathered or fractured portions of this unit have been capable of supporting submersible pumps, and a spring emanating from a limestone outcrop in the bed of McElhaney Creek flows freely and constantly year round. Conversely, where the unit is unweathered or exhibits poorly developed fracture zones, yields have been very poor.

Although the Connellsville Sandstone has been reported to yield up to 25 gal/min in some southern portions of Allegheny County, previous onsite drilling into the upper Connellsville revealed it to be shaley and relatively impervious at the NETL site. However, the lower Connellsville at the contact with the Clarksburg group was very fractured, and at some locations, exhibited water-filled voids.

Lick Run valley, which borders the eastern edge of the PGH site, is composed of silt and sand alluvial deposits. The alluvial deposits comprise a water-bearing unit, which discharges to form the base stream flow within Lick Run. Although shallow piezometers have been established in these deposits, the thickness of this water-bearing unit is unmeasured at the PGH site.

Groundwater Usage

Most of the domestic water supplies for the area surrounding the NETL-PGH site are provided by the American Water Company, which processes water from the Monongahela River. There was, however, at least one groundwater well listed for domestic usage within a 1-mi radius of NETL. This well, situated near central Bruceton, was 140 ft deep and was completed in the Monongahela Group, according to the computerized PADEP Water Well Inventory (as of September 1990). A topographic review of the well's location, based on reported longitude and latitude, indicated that this well was possibly completed in the Conemaugh Group because of the reported depth of the well. The well is located generally due north of NETL, so it should not be affected by groundwater impacts caused by NETL because of the assumed southerly groundwater flow beneath Lick Run valley. There has been a report of a domestic water well on Piney Fork Road (approximately 1.5 mi south of NETL), but this well could not be located or confirmed by preliminary physical exploration. The well was not included on the Water Well Inventory.

The PaDEP Water Well Inventory reported no other domestic wells in Jefferson Borough or South Park Township. However, the inventory does not list those wells that may have been drilled prior to 1966.

General Groundwater Flow Patterns

There are two groundwater flow patterns at NETL. Groundwater flowing in the shallow, weathered bedrock aquifer may percolate along the soil/bedrock interface, along near-vertical stress relief fractures, or both. Groundwater follows the general site topography, flowing from the tops of hills on the site, generally perpendicular to ground surface elevation contours. This flow is directed by the intervening valleys toward Lick Run valley, where it joins the water-bearing unit located in the valley and adds to the base-flow of Lick Run itself. Some of this flow also discharges as springs on the hillsides or in the valleys.

The second flow pattern is associated with the deeper aquifer. Groundwater in this zone generally flows east towards the Lick Run Valley, where it is joined by the water of the shallow zone as it flows off the hillsides.

Local Coal Mining—Mine Workings

The PGH Coal seam outcrops throughout NETL site and underlies a small portion of DOE property, particularly the B-167 area. The coal outcrop can be seen in the hillside above the Main Plateau area. The 900 and 920 areas are built on fill very near to where the coal probably outcropped, but the seam probably has been removed by crop mining or stripping during construction.

The PGH Coal has been extensively mined since the beginning of the century, and is mined out in the area, except for remaining roof support pillars and a small working portion of the onsite Experimental Mine. The coal seam, as with the other strata, dips to the northwest at approximately 10°. Near the eastern boundaries of the site, the top of coal is located at an elevation ranging from 1,015 to 1,020 ft above mean sea level. The dip is such that the top of coal is found near 990 ft at the western end of the site.

Coal Mining—Effect on Groundwater

The coal seam and associated mine workings influence the groundwater where they exist. Fracturing of overlying strata and actual roof collapse has created conduits that act to dewater the overlying rock. This is the case at B-167 (and the adjacent triangle parking lot), where the shallow, weathered bedrock zone was dry. Also, the voids created during mining leave open channels that allow water to flow freely downdip, possibly exiting at old portals. Mining may have removed underlying fire clays usually associated with the bottom of coal seams, opening up the possibility for downward migration of water into the underlying rock. For these reasons, special attention will have to be paid to the coal seam and its relative position to areas of investigation.

7.1.2 MGN Site

The NETL-MGN site is located on the upper slopes of a local surface-water drainage divide that separates two small streams from the Monongahela River. (See Figure 3.) Burroughs Run and West Run border the eastern side of the MGN site and flow into the Monongahela River, which

abuts the northwestern part of the site. The main facilities of NETL are located about 1,300 ft due east of the Monongahela River and across the local drainage divide from the river. Surface drainage around most of NETL's main facilities (except that diverted elsewhere by storm sewers) flows northward into an abandoned, entrenched meander of West Run. Surface runoff from the southeastern corner of the main facilities flows directly into Burroughs Run. NETL's main facilities sit at an elevation of 960 to 980 ft. The Monongahela River flows at an elevation of about 795 ft.

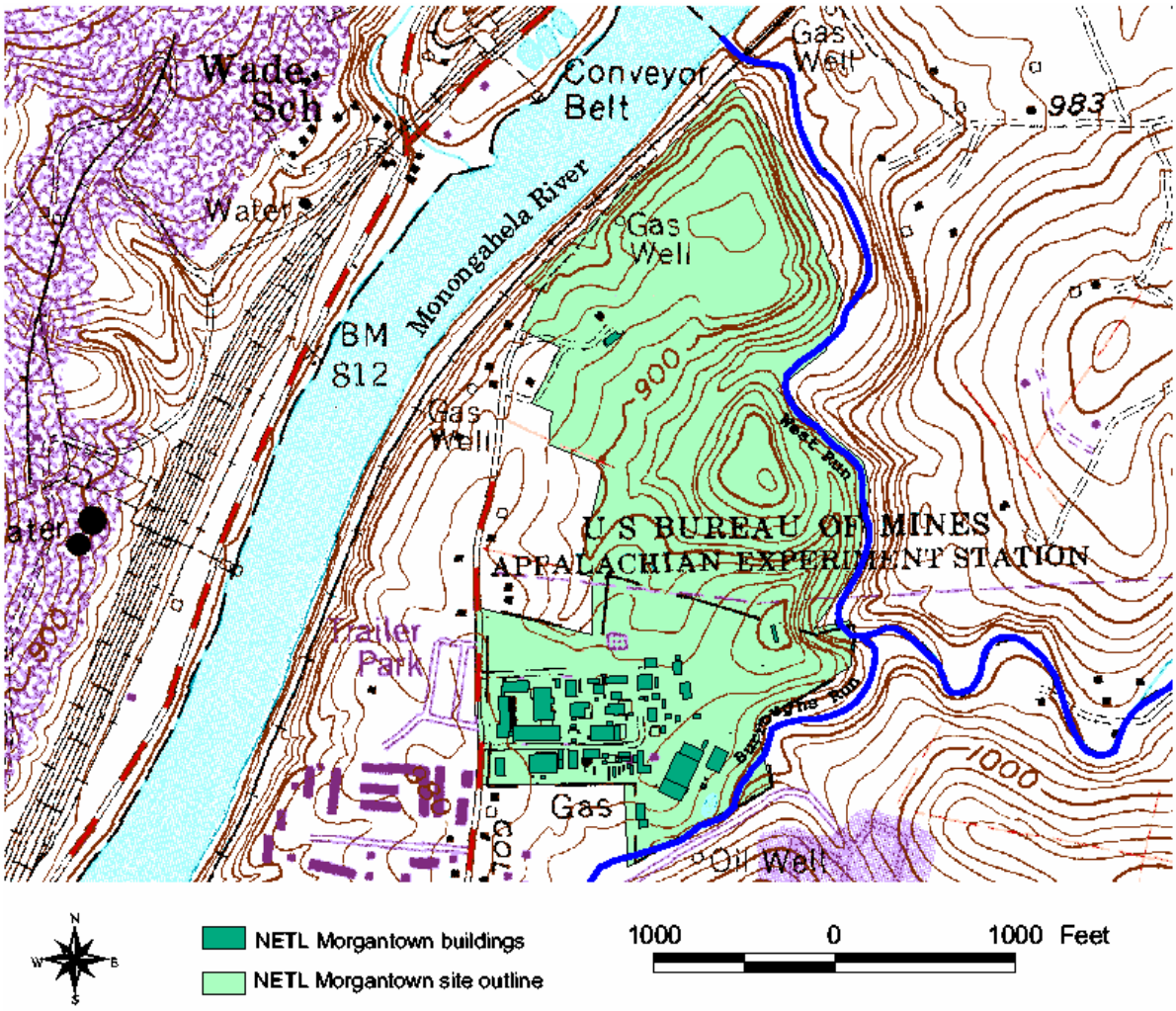

Figure 3. Portion of the USGS Morgantown North 7.5-Minute Topographic Map

Most of Monongalia County is underlain by rocks of low permeability, which consequently yield water at low rates. Wells nearest the MGN site typically have yields of 0.1 L/s (1.6 gal/min) or less. The principal aquifers are in the Pennsylvanian-age Conemaugh Group and the Pottsville Group. Two aquifers of the Conemaugh Group, the Morgantown and Grafton Sandstones, outcrop at the NETL site and are the source of most of the domestic water supplies for the few dwellings near the area that are not connected to MUB water supplies. (See Figure 4 for a generalized stratigraphic chart.) Aquifers of the Pottsville Group, which are deeper, but are regarded as the most important aquifers in the county, yield up to 250 gal/min under artesian

pressure but average about 45 gal/min. The Pottsville Group aquifers are separated from the Conemaugh Group aquifers by several hundred feet of bedrock. There is no apparent communication between these aquifers.

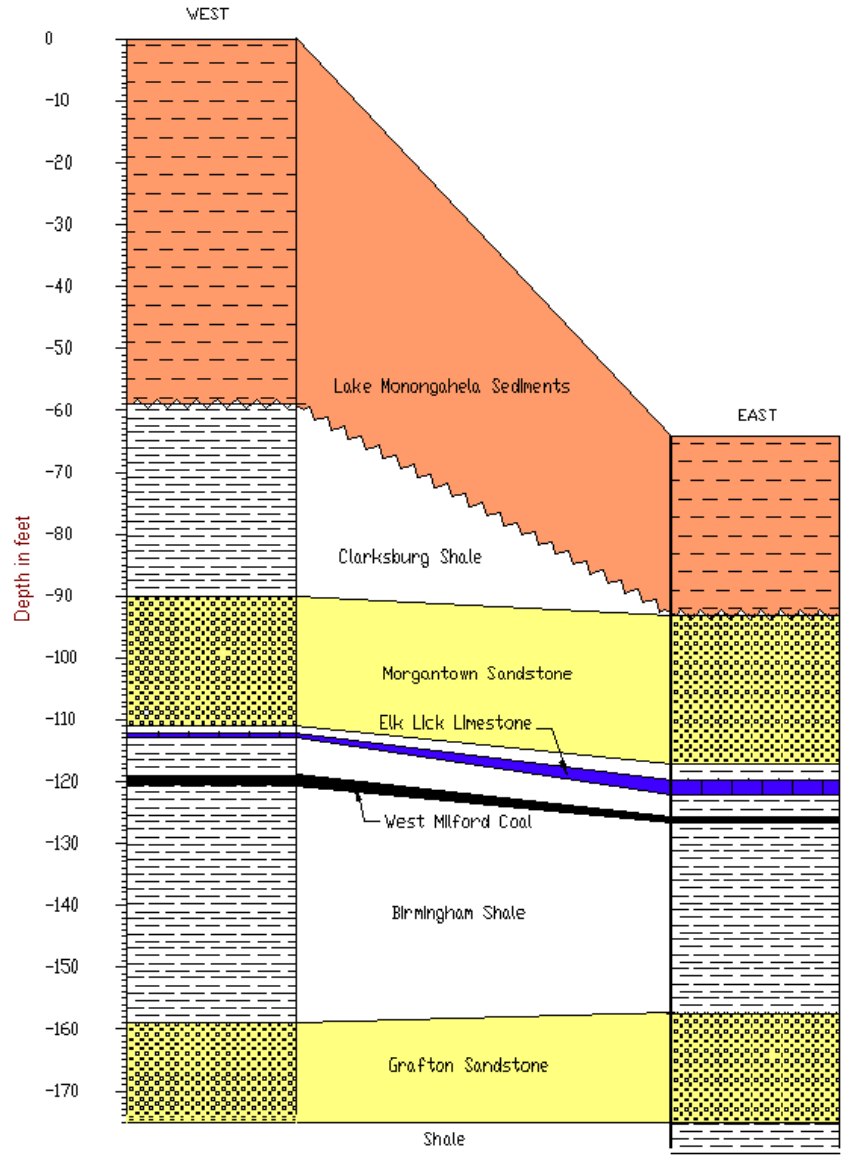

Figure 4. Generalized Stratigraphic Chart for the NETL-MGN site

Bedrock immediately beneath NETL consists of well lithified, fractured shales, siltstones, and sandstones (deltaic deposits) of the Conemaugh Group. A few thin coals and limestones also exist in the near subsurface (see the stratigraphic chart). Bedrock dips 2 to 3° westward toward the Monongahela River. Joints and fractures provide most of the effective porosity and permeability for significant water movement near the ground surface. The Morgantown Sandstone outcrops around the perimeter of NETL property along Burroughs Run (below B-17), West Run, a small unnamed creek north of the electrical substation, and the Monongahela River. Potentiometric surface and outcrop maps for the Morgantown Sandstone are included in the site

Groundwater Monitoring Plan. There are small springs in a number of places along these creeks and the Monongahela River where water flows from fractures in the Morgantown Sandstone. Although the Grafton Sandstone outcrops along West Run below its confluence with Burroughs Run, no springs or seeps have been observed there. The recharge area for these two aquifers is east of Morgantown in the area of Chestnut Ridge, and both discharge regionally into the Monongahela River west of the NETL site. Both the Morgantown and Grafton sandstones have been sampled for possible contamination using monitoring wells at NETL site.

Up to 70 ft of Pleistocene-age unconsolidated Lake Monongahela sediments unconformably overlie the Pennsylvanian-age rocks at the NETL site. These consist of a basal clayey sand that ranges from 10 to 20 ft in thickness, informally named the A aquifer, overlying interbedded clays and clayey sands, informally named the B-C aquifer; and a predominately sand unit, the D, that occurs at the surface on the southwest corner of the site. These sediments were deposited in stream and lacustrine environments as a result of the glacial Lake Monongahela. The A and B-C units are water-bearing under the developed part of the site, and both are monitored for possible groundwater contamination at NETL. Both units extend off the site and recharge is probably away from NETL, since the near-surface sediments are dominated by very low permeability clays in the developed area of the site. Both aquifers outcrop north of the developed area on NETL and adjacent property and form springs and small creeks that drain into West Run. There are probably springs and seeps along the Monongahela River from this unit as well.

Over most areas of the MGN site, the Lake Monongahela sediments lie on shales of the Conemaugh Group. The one known exception is in the vicinity of monitoring well SP4-A (north of B-17), where sands of the A aquifer rest directly on the Morgantown Sandstone. An aquifer test at this location indicated some slight leakage from the "A" to the Morgantown Sandstone. Potentiometric surface maps of the A and B-C units are included in the site Groundwater Monitoring Plan.

7.2 Groundwater Monitoring

7.2.1 General Groundwater Monitoring

The primary objective of the Groundwater Monitoring Program (GMP) is to monitor the shallow, weathered bedrock zone as the first significant aquifer or water-bearing unit beneath NETL facilities. Contamination entering the ground from surficial sources would be expected to impact this zone first and foremost; hence most wells are placed in this zone. The GMP also monitors the wells screened in the deeper water-bearing zone in order to provide data on water quality and contaminant migration (if any).

Another goal of the monitoring program is to identify and characterize groundwater flow, and relate it to surface-water flow conditions, in order to better evaluate potential environmental effects of any groundwater contamination.

By properly determining and characterizing local groundwater conditions, it should be possible to ensure that potential contamination and potential contaminant migration routes are suitably identified and investigated. This should enable sources of potential continuing contamination to be characterized (and remediated if warranted).

The GMP provides the following information:

1. Baseline conditions of groundwater quality and quantity related to the site.
2. Details of the groundwater/surface water relationship.
3. Identification of potential sources of groundwater contamination.
4. Data useful in developing implementation of remedial measures for any NETL facilities/sites that could pose a concern to the environment.
5. Measurement of petroleum hydrocarbons (diesel range organics) in the groundwater at selected wells surrounding abandoned (or previously removed) storage tanks and oil spill areas at the PGH site, per State request.

7.2.2 Data Analysis

Tables 13 to 27 in the appendix present the results of groundwater data collected for the PGH and MGN sites. This analysis consisted of the following:

1. Investigation for immiscible (light or dense) organic phases, continued measurement for specific constituents identified during the initial monitoring phase, RCRA (background year) sampling and analyses, and subsequent RCRA sampling and analyses with statistical comparisons of contamination indicator parameter data.

2. Measurement of petroleum hydrocarbons (diesel range organics) in the groundwater at selected wells surrounding inactive underground storage tanks and oil spill areas at the PGH site, per PaDEP request.

The results of these laboratory analyses produce groundwater chemical-constituent data that must be evaluated to determine whether the facility is contaminating the groundwater.

Down-gradient contamination is indicated by one, or a combination of, the following conditions:

- (1) immiscible organic phases are detected down-gradient; and (2) contaminant concentrations are substantively elevated compared to up-gradient/background (or none detected up-gradient), and substantively exceed state groundwater or drinking water standard maximum contaminant levels (MCLs).

- As defined in Appendix IX of 40 CFR Part 264, (1) dissolved hazardous waste constituents are detected down-gradient; and (2) concentrations are substantively elevated compared to up-gradient/background (or none detected upgradient), and substantively exceed MCLs or a risk is identified through human health evaluations.

Statistical comparisons of semiannual contamination indicator data (up-gradient and down-gradient wells) were made against appropriate up-gradient/background well data. If statistically significant down-gradient differences exist (and are subsequently confirmed by immediate resampling and repeating of statistical analyses), then contamination will be indicated and a human health and ecological risk assessment, a groundwater quality assessment program , or both will be warranted. If no down-gradient statistically significant differences are calculated, routine monitoring will continue.

7.2.3 PGH Site

The results of the PGH site GMP are presented in Tables 13 to 21. The results were compared against Federal and state standards for groundwater. The following is a summary of the results:

- Well VFW-3 exceeded the state drinking water primary MCL for tetrachloroethene. Well VFW-3 is located adjacent to a laboratory waste-water holding tank that overflowed to a French drain more than 13 years ago. The overflow was connected to the sanitary sewer. Well MPW-11 exceeded the EPA Region III risk-based tables for chloroform. Chloroform is a common laboratory contaminant.

- Seven wells exceeded the State drinking water secondary MCL and Act 2 secondary MCL standards for iron. This has been attributed to past mining activities.

- Sixteen wells exceeded the State drinking water secondary MCL, Act 2 secondary MCL, and EPA Region III risk-based tables for manganese. This has been attributed to past mining activities.

- Eighteen wells exceeded the State drinking water secondary MCL and Act 2 secondary MCL for chloride. This has been attributed to past mining activities.

- One well exceeded the State drinking water secondary MCL and Act 2 secondary MCL for fluoride. This has been attributed to past mining activities.

- Nine wells exceeded the State drinking water secondary MCL for sulfate. This has been attributed to past mining activities.

- Twenty wells exceeded the State drinking water secondary MCL for total dissolved solids. This has been attributed to past mining activities.

- Wells MPW-7, MPW-8, VFW-9, and VFW-12 exceeded the EPA Region III risk-based tables for nickel. The level has been contributed in the past to the interaction of the sodium and chloride with the stainless-steel well casing.

- Wells MPW-8 and MPW-10 exceeded the State drinking water secondary MCL standards for pH. These wells are installed in limestone bedrock.

A statistical analysis was conducted on the indicators of groundwater contamination (pH, conductivity, total organic carbon [TOC], and total organic halogens [TOX]). The analysis compared up-gradient wells to down-gradient wells. Results of the statistical analysis follow.

- **pH.** A Tolerance-Interval-two tailed method was used for both the Main Plateau and the Valley Filled wells. The replicate average value was outside the background tolerance intervals for wells MPW-4D, MPW-10, and VFW-1.

- **Specific Conductance**. The Wilcoxon Rank-Sum Test for Two Groups was used for the Main Plateau wells, and the Tolerance-Interval two-tailed method was used for the Valley Filled wells. The specific conductance values for the Main Plateau wells showed no significant change, while wells VFW-6 and VFW-7 were outside the background tolerance limit.

- **TOC.** The Tolerance-Interval two-tailed method was used for both the Main Plateau and the Valley Filled wells. No wells had TOC values outside the background tolerance limit.

- **TOX.** The Wilcoxon Rank-Sum Test for Two Groups was used for the Main Plateau and the Valley Filled wells. The TOX values for all the wells showed no significant change.

Surface Water-Groundwater Interaction is part of the GMP. A piezometer was monitored monthly along Lick Run upstream of the Site and a piezometer was monitored weekly along Lick Run adjacent to the PGH site to determine if Lick Run is a gaining or losing stream. A gaining stream has groundwater flowing to the stream, while a losing stream has surface water flowing to the groundwater. The data collected indicate that Lick Run upstream of the PGH site is a gaining stream for 10 months of the year, but Lick Run adjacent to the PGH site is always a gaining stream.

7.2.4 MGN Site

The objectives of groundwater monitoring at the MGN site were to provide environmental surveillance of each of the two shallow aquifers and the first regional aquifer, and environmental surveillance of a closed and abandoned waste-water pond. A total of 22 groundwater wells were monitored semiannually: 4 wells (3 down-gradient, and 1 up-gradient) in the MGN aquifer, 13 wells (10 down-gradient, and 3 up-gradient) in the A aquifer, 5 wells in the B-C aquifer. The wells that monitor the abandoned waste-water pond are in the A aquifer.

The groundwater monitoring results for the MGN site are presented in Tables 22-27. None of the results exceeded state groundwater standards. Most parameters are monitored in detection mode, that is, results are typically nondetectable. For the parameters that are detected, a statistical analysis was conducted to compare up-gradient and down-gradient values. The following is a summary of the results:

- Nitrate, as nitrogen, was consistently higher than background levels in one well in the shallowest B-C aquifer and in many wells in the deeper unconsolidated A aquifer, but not

higher in the regional Morgantown aquifer. No wells exceeded the West Virginiagroundwater limit.

- Sodium and chloride were higher than background wells in the vicinity of roadways and walkways where salt is applied for de-icing purposes. West Virginia has not set a standard for sodium or chloride.

- Sulfate was consistently higher than background detection wells in two wells in the A" aquifer. West Virginia has not set a standard for sulfate.

- Fluoride was higher than background wells in three wells in the A aquifer and one well in the B-C aquifer. No wells exceeded the West Virginia groundwater limit.

No other parameters were statistically significantly higher in down-gradient wells than up-gradient levels.

8 Quality Assurance

Environmental Sampling and Analysis

All environmental analyses at NETL were performed by an offsite subcontractor in accordance with NETL specifications. This subcontractor is well versed in EPA sampling protocol. The subcontractor was tasked with the fundamental responsibility of establishing and maintaining programs that ensure the reliability and validity of all analytical laboratory and field data. NETL's Quality Assurance (QA) Program demands continuing evidence of the subcontractor's commitment to fulfilling these obligations. The subcontractor's QA Program was implemented throughout the analytical process from preparation for sampling through data management and reporting to ensure reliable and valid analytical data.

Water sampling was performed by an onsite contractor using EPA protocol. The following types of samples were collected at NETL:

Groundwater Monitoring Wells. Groundwater samples were collected following standard operating procedures (SOPs) for groundwater monitoring well sampling.

Water/Waste-Water/Other Discharges. Grab samples were collected following the same strategy outlined in the SOP for groundwater monitoring well sampling. Composite samples were taken using either flow or time weighted automatic samplers.

Sediments, Solids, Drums, Hazardous Wastes. Representative samples were taken by subcontractor personnel following correct sampling protocols. Adherence to appropriate SOP's (e.g., sample containers, preservation) was maintained.

Standard Operating Procedures

NETL required the subcontractor to have SOPs in place for all analytical, technical, and administrative procedures.

Training

The subcontractors ensured that their personnel were trained both technically and with respect to the requirements of their Corporate Quality Assurance Manual, including the implementation of the quality assurance procedures.

Testing

Sampling and analytical services have been provided to NETL by the subcontractor for over 16 years. All testing was performed using approved EPA procedures (recent edition of SW-846) and met the requirements of any Federal/state permits issued to NETL. Samples included the following:

1. Water or waste-water samples,
2. Solid waste samples,
3. Hazardous waste samples,
4. Soil samples,
5. Stream sediment samples,
6. R&D project samples, and
7. Process samples.

Sample sources included the following:

- Industrial waste-water discharge to the local POTW,
- Various sewer system discharges and manholes (i.e., storm-water, sanitary waste-water, process water, and industrial/contaminated waste-water),
- Groundwater monitoring wells,
- Potable water system,
- Streams and rivers,
- Various pits and sumps,
- R&D projects,
- Spills and/or leaks,
- Soils, and
- Solid and/or hazardous waste streams.

The testing process followed a well-documented laboratory quality control (QC) protocol. These procedures defined the requirements for the generation of QC data, subsequent evaluation of the data, and the reporting and statistical data analysis procedures used to provide feedback about the performance of an analytical system.

Where method guidelines were not available, the acceptance criteria used was EPA's contract lab procedure (CLP). If CLP guidelines were not available, internal acceptance criteria were used. It was the responsibility of each analytical staff member to perform all necessary QC procedures and measurements, and to complete all appropriate documentation. Many of these requirements were specified in the methodologies used and were addressed in specific method SOPs.

However, several quality control policies were applicable most of the analytical procedures:

- Prior to the analysis of any sample, the analytical system must have met the required calibration criteria.

- Prior to any sample analysis, an instrument blank must have been performed to demonstrate that the analytical system is void of contamination.

- One method blank must have been analyzed for every prep or analytical batch.

- One laboratory control sample must have been analyzed for every prep or analytical batch.

- One matrix spike or matrix spike duplicate must have been performed for every prep batch.

Groups of samples were assigned to specific QC measurements by batching. Each prep batch had a method blank, a laboratory control sample, a matrix spike/matrix spike duplicate, and no more than 20 field samples of the same matrix. The contents and duration of an analytical batch were clarified in the method SOPs.

Quality Control Data

Outlined below are the various quality control measurements utilized by the analytical staff to assess data quality:

Duplicate Analysis. Two independent measurements for a particular analyte were acquired from the same analytical system on the same sample. This QC measurement provided information on analytical precision.

***Matrix Spike Analysis*.** A known concentration of the target analyte was added to the sample matrix. This spike analysis provided information on the analytical accuracy and matrix effect the sample may have on the recovery of the target analyte.

Matrix Spike/Matrix Spike Duplicate Analysis. This analysis was a matrix spike analysis performed in duplicate. This procedure provided information on both the precision and accuracy of the analytical system.

Surrogate Spike Analysis. A specific compound at a known concentration was added to the sample matrix. Because the surrogate compound was generally similar to the target compounds, its recovery should indicate some correlation to target compound recovery.

***Laboratory Control Sample*.** This analysis was an independent source standard of known concentration. This type of analysis was necessary to verify good laboratory practice.

Control Charts

A control chart is a means of looking at trends in the data. By having available a current control chart, the analyst can determine the quality of the current QC data to help judge the status of the analysis. The type of control chart used was the Shewhart Control Chart in the form of x, s (X-bar, sigma).

The chart allowed the analyst to determine which data points (representing QC measurement events) were part of an out-of-control population and therefore indicative of possible problems in the analytical system. This procedure allowed the analyst to empirically differentiate between normal variation inherent in any measurement process and variations that were attributable to a process moving away from normal.

The chart was particularly useful for uncovering trending. Trending is the characteristic of data in a given population to cluster on one side of the mean or show greater separation from the mean when the population is changing. Such behavior indicates that measurement conditions may also be changing and investigation of the system may be warranted.

Reporting

All associated QC data were reported for each sample being analyzed using the SOPs for data package preparation.

Waste Disposal

Upon completion of all required analyses, all remaining samples, sample material, and contaminated sample containers were managed or disposed of in accordance with all applicable laws and regulations (RCRA regulations). The final disposition of these items was approved by NETL and was fully documented in quarterly sample disposition reports.

All hazardous waste generated at NETL was disposed of in accordance with applicable Federal Regulations (EPA). Waste was placed in specified containers, labeled, and shipped to a contracted waste disposal firm.

The QA procedure for hazardous waste manifesting involved two to four separate reviews, depending upon the complexity and quantity of the shipment. A Uniform Hazardous Waste Manifest was created by the licensed hazardous waste hauler 1 to 2 days prior to the shipping date. This provided an opportunity for the site support contractor hazardous waste technicians, project engineer, and DOE personnel to review and correct or adjust the manifest to ensure that it complied with DOT and RCRA regulations. Changes were made to the manifest if needed and then it was signed by the DOE Hazardous Waste Program Manager. All personnel involved in hazardous waste disposal are trained annually to ensure familiarity with all applicable RCRA and DOT regulations.

During the shipping activities NETL QA personnel are present to ensure the following:

1. Hazardous waste manifests were prepared properly,
2. The licensed transporter complied with all applicable DOT placarding requirements,
3. Hazardous waste did not exceed the permissible 90-day retention period,
4. The transport vehicle was properly identified (EPA identification number, state transporter number),
5. The transporter driver had the proper DOT licensing,
6. Spill kits were available to the transport driver during transit,
7. The total number of loaded items conformed to the value listed on the manifest, and
8. Hazardous waste containers had the proper EPA labeling waste identification on the labels.

Any deficiencies were immediately corrected prior to the transport of the hazardous waste to the offsite treatment, storage, and disposal (TSD) facility. There were no deficiencies in transported waste.

Laboratory Certifications

The subcontractor laboratory held the following certifications:

- State of Colorado Department of Health for Drinking Water Analysis
- State of Delaware Department of Health for Drinking Water Analysis
- State of Kentucky Department of Health for Drinking Water analysis
- State of Virginia Department of Health for Drinking Water Analysis
- State of Maryland Department of Health for Drinking Water Analysis
- State of Massachusetts Department of Health for Drinking Water Analysis
- State of Minnesota Department of Health for Drinking Water Analysis
- State of Michigan Department of Health for Drinking Water Analysis
- State of New Jersey Department of Health for Drinking Water Analysis
- State of Tennessee for Underground Storage Tank Program
- U.S. Department of Agriculture (USDA-APHIS) for the importation of foreign soil
- U.S. Drug Enforcement Agency for handling of controlled substances
- West Virginia Department of Health for Drinking Water Analysis
- West Virginia Division of Environmental Protection for NPDES Laboratory Certification Program
- West Virginia Board of Pharmacy for handling of controlled substance.

Laboratory Proficiency Programs

The subcontractor laboratory actively and regularly participated in various external-performance evaluation programs, internally administered blind-performance evaluations, and an internal corporate round-robin program.

Performance Evaluation Samples (PES). These samples were defined as third-party prepared check samples, whose values were known only to the third party prior to completion of the analyses. The subcontractor was made aware that the samples were PES but did not have access to the true value information until after the results were submitted. In all cases, these were analyzed by many laboratories and the results were reported in order to reference them to overall laboratory performance (round-robin analysis). The PES, therefore, gave an independent measure of laboratory performance.

Internal Blind-Performance Evaluation Samples (IBPES). These samples, frequently referred to as blinds, were check samples that were purchased or prepared by the QA/QC office and submitted to the laboratory as a regular sample. The lab staff had no knowledge that the sample was a check sample and it was processed in the normal fashion. While the PES gave a good assessment of optimum performance, the IBPES assessed usual performance. The QA/QC office was required to pass at least one IBPES through each analytical group (measuring as many parameters as possible) at least twice a year. Frequent use of independent check samples was made, along with standard reference materials obtained from various government agencies. All IBPES activity was documented in the QA/QC log kept for that purpose. NETL also submitted blind performance evaluation samples to the subcontractor periodically.

Audits/Assessments from External Agencies

An audit was a review of all procedures used in laboratory operations to ensure compliance with the written QA/QC plan and written analytical SOPs. Three types of audits were performed:

System Audit. A comprehensive review of one analytical method (or a group of closely related methods) over a specific time period (one to three months at the discretion of the QA/QC officer). The following areas were part of a system audit:

- A review of the analytical results reported during the chosen time period.
- An interview with the analyst regarding pertinent analytical SOPs.
- A review of analytical run logs for the chosen time period.
- A review of calibration data over the same time period including the source and make-up of the calibrates.
- A review of QC data acquired (duplicates, spikes, blanks, and spike duplicates) for that time period.
- A review of the group's QC log to evaluate the documentation and corrective action taken of any out-of-control events for the method in question.
- A review of any and all instrument maintenance logs for instruments used in the analysis.
- An assessment of how easily the above documentation was retrieved.

The QA/QC office was required to conduct a system audit of each method or method group at a minimum of once every 6 moths.

Case Audit. This consisted of following a single sample or set of samples through the entire analytical process, from sample intake and log-in to the final report. There was no minimum number of case audits required in a given time period, and audits were conducted at the QA/QC officer's discretion.

Client and/or Third-Party Audits. The subcontractor was audited by professionals representing both regulatory agencies and clients. Recent audits include:

- West Virginia Department of Public Health: for West Virginia certification to perform drinking water analyses.
- WVDEP: for West Virginia NPDES certification.
- U.S. Department of Agriculture: for a Federal permit to import foreign soil.

List of Abbreviations

AA/RC	asbestos abatement/removal contractor
ACHD	(PA) Allegheny County Health Department
ACM	asbestos-containing material
AEA	Atomic Energy Act
AEO	Arctic Energy Office in Fairbanks, AK
AIIS	Assessment Input Information System
B	building
BTEX	benzene, toluene, ethyl benzene, and xylenes
BOD	biological oxygen demand
CAA	Clean Air Act
$CBOD_5$	carbonaceous biochemical oxygen demand 5-day test
CBT	computer-based training
CDC	Centers for Disease Control and Prevention
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFC	chlorofluorohydrocarbans
CFR	(U.S.) Code of Federal Regulations
CHF	Chemical Handling Facility
CLP	contract lab procedure
COR	Contracting Officer's Representative
CWA	Clean Water Act
DOE	(U.S.) Department of Energy
DOT	(U.S.) Department of Transportation
EA	environmental assessment
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
EMS	Environmental Management System
EOC	Emergency Operations Center
EPA	((U.S.) Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act
ERO	Emergency Response Organizatio
ESA	Endangered Species Act
ES&H	environment, safety, and health
FE	(DOE) Office of Fossil Energy
FEMP	Federal Energy Management Program
FFCA	Federal Facilities Compliance Act
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FONSI	Finding of No Significant Impact
FRAM	Functions, Roles, and Authorities Manual
FWS	Fish and Wildlife Service
FY	fiscal year
GMP	Groundwater Monitoring Program
HAZCOM	Hazard Communication

HAZWOPER	Hazardous Waste Operations and Emergency Response
HP	horsepower
HVAC	heating, ventilation and air conditioning
IBPES	international blind performance evaluation samples
ISM	integrated safety management
ISMS	Integrated Safety Management System
ISO	International Organization for Standardizatio
ISUP	Industrial Sewer Use Permit
LWHT	laboratory waste-water holding tank
MCL	maximum contaminant level
MGN	NETL's site at Morgantown, WV
MSDS	material safety data shee
MSHA	Mine Safety and Health Administratio
MUB	Morgantown Utility Board
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NETL	National Energy Technology Laboratory
NIOSH	National Institute for Occupational Safety and Health
NOV	Notice of Violation
NPDES	National Pollutant Discharge Elimination System
NPL	national priority list
NPTO	National Petroleum Technology Office in Tulsa, OK
NRC	Nuclear Regulatory Commission
OAQ	(WV) Office of Air Quality
ODS	ozone-depleting substance
OSHA	(U.S.) Occupational Safety and Health Administration
PaDEP	Pennsylvania Department of Environmental Protection
PA	preliminary assessment
PCB	polychlorinated biphenyl
PDU	process development unit
PES	performance evaluation samples
PFBC	Pennsylvania Fish and Boat Commission
PGC	Pennsylvania Game Commission
PGH	NETL's site at Pittsburgh, PA
PHA	(PA) Pleasant Hills Authority
PNDI	Pennsylvania Natural Diversity Inventory
POTW	Publicly Owned Treatment Works
PPOA	Pollution Prevention Opportunity Assessment
PQAE	Project Quality Assurance Engineer
PRISM	Pollution Prevention, Regulatory Compliance, Improving Continually, Safety Analysis and Review System, and Minimization of Waste
QA	Quality Assurance
QC	Quality Control
R&D	research and development
RCRA	Resource Conservation and Recovery Act
SAQ	screening analysis questionnaire

SARA	Superfund Amendment and Reauthorization Act
SARS	Safety Analysis and Review Syste
SCNG	Strategic Center for Natural Gas
SDWA	Safe Drinking Water Act
SEA	site evaluation accomplished
SERC	State Emergency Response Commission
SOPs	**s**tandard operating procedure
SWPPP	Storm Water Pollution Prevention Plan
syngas	synthetic gas
TOC	total organic carbon
TOX	total organic halide
TPH	total petroleum hydrocarbons
TPQ	threshold planning quantity
TRI	toxic release inventory
TSCA	Toxic Substances Control Act
TSD	treatment,storage, and disposal
TSS	total suspended solids
TVA	Tennessee Valley Authority
WDEQ	Wyoming Department of Environmental Quality
WVDEP	West Virginia Department of Environmental Protection
WVDNR	West Virginia Division of Natural Resource
WWTF	waste-water treatment facility

Appendix: Tables 10 Through 27

Table 10. NETL NPDES Storm-Water Analysis Results

PGH

Constituent	Sample Date			
	02/26/02	5/07/02	9/26/02	12/19/02
North Outfall - PGH				
Flow	0.913 MGD	0.150 MGD	0.063 MGD	0.156 MGD
Suspended Solids	150 mg/L	8.0 mg/L	10 mg/L	ND
CBOD5	3.2 mg/L	ND	1.7 mg/L	ND
Oil and Grease	ND	ND	ND	ND
Aluminum	3.3 mg/L	ND	ND	ND
Iron	6.3 mg/L	0.42 mg/L	0.17 mg/L	0.24 mg/L
Manganese	1.0 mg/L	0.32 mg/L	0.26 mg/L	0.34 mg/L
Lead	40 □g/L	ND	ND	ND
Mercury	ND	ND	ND	0.23 □g/L
pH	8.10 s.u.	8.11 s.u.	8.27 s.u.	7.74 s.u.
Ammonia Nitrogen	7.2 mg/L	ND	ND	ND
South Outfall - PGH				
Flow	3.684 MGD	1.738 MGD	0.290 MGD	0.372 MGD
Suspended Solids	42 mg/L	55 mg/L	21 mg/L	49 mg/L
Aluminum	2.9 mg/L	6.1 mg/L	1.6 mg/L	3.5 mg/L
Iron	1.5 mg/L	1.1 mg/L	1.6 mg/L	1.1 mg/L
Manganese	0.17 mg/L	0.38 mg/L	0.48 mg/L	0.49 mg/L
Lead	23 □g/L	ND	ND	13 □g/L
pH	7.82 s.u.	7.74 s.u.	7.87 s.u.	7.47 s.u.
Ammonia Nitrogen	2.3 mg/L	2.2 mg/L	1.9 mg/L	1.8 mg/L

MGD = millions of gallons per day; s.u. = standard units: ND = Non Detected.

MGN

Outfalls - MGN							
Constituents	Cutoff Conc.	Outfall 002		Outfall 005		Outfall 010	
		3/26/02	11/05/02	3/26/02	11/05/02	3/26/02	11/05/02
Nitrate + Nitrite Nitrogen (Grab)	0.68 mg/L	1.6 mg/L	0.4 mg/L	1.30 mg/L	0.28 mg/L	NS	NS
Ammonia Nitrogen (Grab)	4 mg/L	ND	ND	ND	ND	ND	ND
Fecal Coliform (Grab)	None	1,700 col/100mL	40 col/100mL	300 col/100mL	40 col/100mL	400 col/100mL	8 col/100mL
Total Suspended Solids (Grab)	100 mg/L	NS	NS	85 mg/L	88 mg/L	NS	NS

NS = not sampled; ND = not detected

Table 11. NETL-PGH 2002 Waste-Water Effluent Analysis (mg/L)

Constituent	Permit Limit												
	Sampling Date	01/08/02	02/07/02	03/05/02	04/02/02	05/07/02	06/04/02	07/09/02	08/06/02	09/10/02	10/08/02	11/05/02	12/04/02
B- 74 Waste-water Treatment Facility Effluent													
Aluminum	None	0.15	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.17	ND
Cadmium	None	ND	ND	ND	ND	ND	ND	ND	0.0040	ND	ND	ND	ND
Chromium	None	ND	ND	ND	ND	ND	ND	ND	0.0057	ND	ND	ND	ND
Copper	0.08	ND	0.0052	ND	ND	ND	ND	ND	ND	0.013	0.0055	ND	0.0079
Cyanide (Free)	<0.005	ND	ND	ND	ND	ND	ND	0.023	ND	ND	ND	ND	ND
TOX	None	0.057	0.038	0.044	0.048	0.043	0.038	0.037	0.051	0.036	ND	0.036	ND
Iron	None	0.11	0.35	0.36	0.53	0.60	0.15	0.32	1.2	1.1	0.46	0.48	0.14
Lead	None	ND	ND	ND	ND	ND	ND	ND	0.0075	ND	ND	ND	ND
Mercury	<0.0002	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00025	ND	0.00038
Nickel	None	ND	ND	0.017	ND	ND	ND	0.0051	0.0064	0.016	0.0070	ND	ND
Oil & Grease	None	18	ND	ND	ND	ND	ND	ND	ND	ND	8.2	ND	ND
pH (s.u.)	6.0-9.0	7.5	7.5	7.6	7.5	7.6	7.3	7.7	8.2	7.0	7.3	7.9	7.4
Phenolics	0.025	ND	0.0060	ND	ND	ND	ND	ND	0.0091	0.0080	0.0063	ND	ND
TSS	None	ND	9.0	ND	8.0	7.0	ND	ND	ND	6.0	ND	ND	ND
Tin	None	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	ND	ND
Trichloromethane	<0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Zinc	None	ND	ND	0.024	0.026	0.026	ND	0.033	ND	0.28	0.065	0.073	0.039

ND = not detected; NS = not sampled; TOX = total organic halogens; TSS = total suspended solids; s.u. = standard units
Standard/Guideline – Pleasant Hills Authority Industrial Sewer Use Permit, December 28, 2001.
Permit exceedances = shaded value.

Table 11. NETL-MGN 2002 Waste-Water Effluent Analysis (lb/d) (continued)

Parameter	Limit	Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.
Flow (MGD): Monthly Avg.	0.09	0.04	0.01	0.02	0.01	0.01	0.03	0.01	0.01	0.01	0.01	0.01	0.03
Daily Maximum	0.15	0.13	0.06	0.05	0.02	0.02	0.03	0.02	0.03	0.06	0.03	0.02	0.05
BOD5: Monthly Avg.	None	ND	ND	ND	ND	ND	0.68	ND	ND	ND	0.12	0.23	0.6
Daily Maximum	None	ND	ND	ND	ND	ND	2.05	ND	ND	ND	0.35	0.45	1
TSS: Monthly Avg.	None	ND	1.2	1.3	0.6	1.6	0.8	ND	0.7	0.6	0.4	ND	2.8
Daily Maximum	None	ND	7	3.3	1.2	3.2	2.5	ND	2	3.5	1.3	ND	4.6
Arsenic: Monthly Avg.	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Daily Maximum	0.008	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cadmium: Monthly Avg.	None	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0008
Daily Maximum	None	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.001
Chromium: Monthly Avg.	0.007	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.003
Daily Maximum	0.011	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.005
Copper: Monthly Avg.	0.04	0.01	0.01	0.005	0.003	0.002	0.002	0.001	0.001	0.001	0.001	0.002	0.03
Daily Maximum	0.06	0.03	0.02	0.01	0.005	0.003	0.008	0.001	0.003	0.005	0.003	0.003	0.05
Cyanide: Monthly Avg.	0.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Daily Maximum	0.03	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Lead: Monthly Avg.	0.025	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0004	0.002
Daily Maximum	0.038	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.001	0.003
Mercury: Monthly Avg.	0.0006	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00002	0.00007
Daily Maximum	0.0009	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00004	0.0001
Nickel: Monthly Avg.	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.008
Daily Maximum	0.015	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.013
Silver: Monthly Avg.	0.011	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Daily Maximum	0.017	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Zinc: Monthly Avg.	0.2	0.03	0.01	0.02	0.01	0.02	0.01	0.01	0.02	0.01	0.01	0.01	0.05
Daily Maximum	0.3	0.09	0.05	0.05	0.02	0.05	0.03	0.01	0.05	0.04	0.03	0.02	0.08
Iron: Monthly Avg.	None	0.24	0.04	0.08	0.07	0.06	0.05	0.02	0.02	0.02	0.02	0.07	0.5
Daily Maximum	None	0.77	0.21	0.19	0.13	0.11	0.14	0.04	0.06	0.1	0.06	0.14	0.83
Manganese: Monthly Avg.	None	0.1	0.03	0.04	0.02	0.02	0.01	0.02	0.01	0.02	0.01	0.01	0.18
Daily Maximum	None	0.31	0.17	0.11	0.05	0.04	0.03	0.04	0.03	0.13	0.02	0.02	0.3
Phenolics: Monthly Avg.	None	ND	ND	ND	ND	ND	ND	0.0009	ND	ND	ND	ND	ND
Daily Maximum	None	ND	ND	ND	ND	ND	ND	0.002	ND	ND	ND	ND	ND
Total Organic Halogens:													
Monthly Avg.	None	0.023	0.006	0.011	0.005	0.005	0.004	0.005	0.005	0.007	0.005	0.005	0.011
Daily Maximum	None	0.076	0.034	0.027	0.01	0.01	0.011	0.009	0.01	0.041	0.016	0.01	0.018
Organics: Monthly Avg.	None	NS	NS	NS	NS	NS	NS	NS	NS	ND	NS	NS	NS
Daily Maximum	None	NS	NS	NS	NS	NS	NS	NS	NS	ND	NS	NS	NS
pH (s.u.): Minimum	6.0	6.1	7.0	6.5	6.2	6.1	6.2	6.2	6.8	6.4	6.4	7.2	6.6
Maximum	9.0	8.5	8.7	7.2	7.2	8.7	8.5	7.3	7.5	7.3	7.3	9.0	8.8

MGD = millions of gallons per day; NS = not sampled; ND = not detected; TSS = total suspended solids; BOD5 = biological oxygen demand for 5-day period; s.u. = standard units.

Table 12. 2002 NETL-PGH Industrial Sewer Use Permit Monitoring Analysis

Constituent	Free Cyanide	Phenol	Copper	Mercury	Chloroform	pH
Permit Limit	**<0.010 mg/L**	**0.050 mg/L**	**0.08 mg/L**	**<0.0002 mg/L**	**<10 ug/L**	**6.0 - 9.0 s.u.**
April 2, 2002 Sampling Date						
Subinterceptor Location						
Composite	N/A	N/A	0.16 mg/L	ND	N/A	N/A
Grab #1	ND	ND	N/A	N/A	ND	8.18 s.u.
Grab #2	ND	0.023 mg/L	N/A	N/A	ND	8.41 s.u.
Grab #3	ND	0.026 mg/L	N/A	N/A	ND	8.14 s.u.
Grab #4	ND	0.021 mg/L	N/A	N/A	ND	8.47 s.u.
B- 74 Effluent						
Composite	N/A	N/A	ND	ND	N/A	N/A
Grab #1	ND	ND	N/A	N/A	ND	6.87 s.u.
Grab #2	ND	ND	N/A	N/A	ND	7.53 s.u.
Grab #3	ND	ND	N/A	N/A	ND	7.21 s.u.
Grab #4	ND	ND	N/A	N/A	ND	7.36 s.u.
October 8, 2002 Sample Date						
Subinterceptor Location						
Composite	N/A	N/A	0.053 mg/L	0.0011 mg/L	N/A	N/A
Grab #1	ND	0.011 mg/L	N/A	N/A	ND	7.34 s.u.
Grab #2	ND	0.012 mg/L	N/A	N/A	ND	7.73 s.u.
Grab #3	ND	0.020 mg/L	N/A	N/A	ND	7.76 s.u.
Grab #4	ND	0.014 mg/L	N/A	N/A	ND	7.59 s.u.
B- 74 Effluent						
Composite	N/A	N/A	0.0068 mg/L	0.00081 mg/L	N/A	N/A
Grab #1	ND	ND	N/A	N/A	ND	7.03 s.u.
Grab #2	ND	ND	N/A	N/A	ND	7.64 s.u.
Grab #3	ND	ND	N/A	N/A	ND	7.62 s.u.
Grab #4	ND	ND	N/A	N/A	ND	7.59 s.u.

ND = not detected; N/A = not applicable; s.u. = standard units; mg/L = milligrams per liter; □g/L = micrograms per liter;
permit exceedances = shaded values.

Table 13. NETL-PGH 2002 Groundwater Detection Monitoring Program, Results of Analysis - Groundwater Samples, Main Plateau - Contamination Indicator Constituents

	Constituents	Well													
		MPW-1		MPW-1-1	MPW-2		MPW-2-1	MPW-4		MPW-4-1	MPW-4D		MPW-4D-1	MPW-7	
Week	Sample Event	Round 1	Round 2	Round 1	Round 1	Round 2	Round 1	Round 1	Round 2	Round 2	Round 1	Round 2	Round 2	Round 1	Round 2
Week 1	**Sample Date**	03/06/02	07/10/02	03/06/02	03/06/02	07/10/02	03/06/02	03/06/02	07/10/02	07/10/02	03/06/02	07/10/02	N/A	03/06/02	07/10/02
	pH (standard units)	6.93	7.41	6.93	7.35	7.24	7.35	7.25	7.24	7.24	7.86	8.19	N/A	7.36	7.22
	Specific Conductance	3420	1730	3420	3920	4040	3920	2580	2390	2390	890	930	N/A	1540	1270
	Temperature (^{0}C)	15.9	15.6	15.9	12.7	15.0	12.7	12.9	14.5	14.5	12.0	15.3	N/A	14.7	16.7
	TOX (μg/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	N/A	ND	ND
	TOC (mg/L)	2.1	1.4	2.2	2.1	2.9	1.6	2.3	2.4	2.4	2.4	2.8	N/A	3.0	3.6
Week 2	**Sample Date**	04/03/02	08/07/02	N/A	04/03/02	08/07/02	N/A	04/03/02	08/07/02	N/A	04/03/02	08/07/02	N/A	04/03/02	08/07/02
	pH (standard units)	7.38	7.44	N/A	7.43	7.11	N/A	7.01	7.09	N/A	8.00	8.21	N/A	7.11	7.27
	Specific Conductance	2550	3540	N/A	3730	4120	N/A	2290	2420	N/A	850	940	N/A	1560	1470
	Temperature (^{0}C)	11.4	15.6	N/A	11.3	14.3	N/A	12.6	14.6	N/A	11.7	14.6	N/A	13.3	17.3
	TOX (μg/L)	ND	ND	N/A	ND	ND	N/A	ND	ND	N/A	ND	ND	N/A	ND	ND
	TOC (mg/L)	2.2	2.3	N/A	2.4	2.2	N/A	2.5	2.1	N/A	3.0	3.1	N/A	3.9	4.2
Week 3	**Sample Date**	05/09/02	09/11/02	N/A	05/09/02	09/11/02	N/A	05/09/02	09/11/02	N/A	05/09/02	09/11/02	N/A	05/09/02	09/11/02
	pH (standard units)	7.17	7.26	N/A	6.70	6.88	N/A	6.92	6.85	N/A	8.11	8.15	N/A	6.88	6.93
	Specific Conductance	1540	2200	N/A	3330	4130	N/A	2480	2460	N/A	850	1040	N/A	1060	1070
	Temperature (^{0}C)	17.9	15.4	N/A	14.7	15.0	N/A	13.9	15.7	N/A	14.7	14.7	N/A	16.2	17.6
	TOX (μg/L)	ND	ND	N/A	ND	ND	N/A	ND	ND	N/A	ND	ND	N/A	ND	ND
	TOC (mg/L)	2.9	3.0	N/A	2.3	2.0	N/A	14	2.2	N/A	1.9	3.4	N/A	4.0	4.2
Week 4	**Sample Date**	06/05/02	10/10/02	N/A	06/05/02	10/10/02	N/A	06/05/02	10/10/02	N/A	06/05/02	10/10/02	10/10/02	06/05/02	10/08/02
	pH (standard units)	7.30	6.97	N/A	7.23	6.73	N/A	6.80	6.71	N/A	7.68	7.91	7.91	6.70	6.53
	Specific Conductance	1630	2030	N/A	3820	4020	N/A	2350	2230	N/A	940	930	930	2080	1070
	Temperature (^{0}C)	15.5	15.3	N/A	14.2	14.9	N/A	14.6	15.9	N/A	15.0	15.3	15.3	16.3	16.5
	TOX (μg/L)	ND	ND	N/A	ND	ND	N/A	ND	ND	N/A	ND	24	ND	ND	ND
	TOC (mg/L)	2.6	3.0	N/A	1.5	4.0	N/A	2.4	3.5	N/A	2.9	5.3	6.2	3.5	5.9
2002 Range	pH (standard units)	6.93 - 7.44		N/A	6.70 - 7.43		N/A	6.71 - 7.25		N/A	7.68 - 8.21		N/A	6.53 - 7.36	
	Specific Conductance	1540 – 3540		N/A	3330 - 4130		N/A	2230 - 2580		N/A	850 - 1040		N/A	1060 - 2080	
	Temperature (^{0}C)	11.4 - 17.9		N/A	11.3 - 15.0		N/A	12.6 - 15.9		N/A	11.7 - 15.3		N/A	13.3 - 17.6	
	TOX (μg/L)	ND		N/A	ND		N/A	ND		N/A	ND - 24		N/A	ND	
	TOC (mg/L)	1.4 - 3.0		N/A	1.5 - 4.0		N/A	2.1 - 14		N/A	1.9 - 5.3		N/A	3.0 - 5.9	

Specific conductance unit = □mhos/cm @ 25 □C; ND = Not Detected; N/A = Not applicable; TOX = total organic halogens; TOC = total organic carbon

Table 13. NETL-PGH 2002 Groundwater Detection Monitoring Program, Results of Analysis - Groundwater Samples, Main Plateau - Contamination Indicator Constituents (continued)

	Constituents	Well															
		MPW-7D		MPW-8		MPW-8-1	MPW-9		MPW-9-1	MPW-10		MPW-10-1	MPW-11		MPW-11-1	MPW-12	
Well	Sample Event	Round 1	Round 2	Round 1	Round 2	Round 2	Round 1	Round 2	Round 1	Round 1	Round 2	Round 2	Round 1	Round 2	Round 1	Round 1	Round 2
Week 1	Sample Date	03/06/02	07/10/02	03/06/02	07/10/02 1	N/A	03/06/02	07/10/02	N/A	03/06/02	07/10/02	N/A	03/06/02	07/10/02	N/A	03/06/02	07/10/02
	pH (standard units)	NS	NS	7.20	7.08	N/A	7.51	7.54	N/A	8.43	8.78	N/A	7.53	7.32	N/A	NS	7.33
	Specific Conductance	NS	NS	4040	4620	N/A	750	810	N/A	700	740	N/A	2470	2370	N/A	NS	3770
	Temperature (^{0}C)	NS	NS	16.2	18.7	N/A	11.8	14.3	N/A	12.0	13.7	N/A	14.8	16.7	N/A	NS	19.3
	TOX (μg/L)	NS	NS	ND	ND	N/A	ND	ND	N/A	ND	ND	N/A	ND	ND	N/A	NS	ND
	TOC (mg/L)	NS	NS	1.5	2.4	N/A	1.8	2.2	N/A	2.5	2.2	N/A	1.5	2.1	N/A	NS	1.9
Week 2	Sample Date	04/03/02	08/07/02	04/03/02	08/07/02	N/A	04/03/02	08/07/02	N/A	04/03/02	08/07/02	08/07/02	04/03/02	08/07/02	N/A	04/03/02	08/07/02
	pH (standard units)	7.09	NS	6.14	7.12	N/A	7.64	7.52	N/A	8.75	8.85	8.85	7.40	7.34	N/A	NS	7.20
	Specific Conductance	1690	NS	4880	4560	N/A	710	300	N/A	640	390	390	2360	2320	N/A	NS	5540
	Temperature (^{0}C)	10.8	NS	16.6	18.5	N/A	10.3	13.1	N/A	11.2	13.2	13.2	14.4	16.5	N/A	NS	16.2
	TOX (μg/L)	ND	NS	ND	ND	N/A	ND	ND	N/A	ND	ND	ND	ND	ND	N/A	NS	ND
	TOC (mg/L)	2.7	NS	2.1	1.7	N/A	2.2	3.1	N/A	2.7	2.6	2.6	2.1	2.4	N/A	NS	2.4
Week 3	Sample Date	05/09/02	09/11/02	05/09/02	09/11/02	09/11/02	05/09/02	09/11/02	N/A	05/09/02	09/11/02	N/A	05/09/02	09/11/02	05/09/02	05/09/02	09/11/02
	pH (standard units)	NS	NS	6.65	6.97	6.97	7.25	7.47	N/A	8.59	8.07	N/A	6.93	7.10	6.93	6.76	6.96
	Specific Conductance	NS	NS	4440	4610	4610	720	760	N/A	690	740	N/A	2280	2290	2280	6880	5910
	Temperature (^{0}C)	NS	NS	17.9	20.4	20.4	13.8	13.5	N/A	13.5	13.6	N/A	16.6	17.1	16.6	17.2	17.5
	TOX (μg/L)	NS	NS	ND	ND	ND	ND	ND	N/A	ND	ND	N/A	ND	ND	ND	ND	ND
	TOC (mg/L)	NS	NS	1.9	2.4	1.8	2.2	3.1	N/A	2.4	3.5	N/A	2.3	2.6	2.0	3.1	1.7
Week 4	Sample Date	06/05/02	10/08/02	06/05/02	10/08/02	N/A	06/05/02	10/08/02	06/05/02	06/05/02	10/08/02	N/A	06/05/02	10/10/02	N/A	06/05/02	10/10/02
	pH (standard units)	6.92	NS	6.43	7.18	N/A	7.43	7.16	7.43	8.40	8.45	N/A	6.95	NS	N/A	6.85	6.84
	Specific Conductance	1960	NS	4660	4350	N/A	810	740	810	740	560	N/A	2440	NS	N/A	4830	5180
	Temperature (^{0}C)	20.0	NS	18.1	21.1	N/A	14.3	12.3	14.3	13.5	13.4	N/A	16.9	NS	N/A	17.0	15.9
	TOX (μg/L)	ND	NS	ND	ND	N/A	ND	ND	ND	ND	ND	N/A	ND	NS	N/A	ND	ND
	TOC (mg/L)	2.2	NS	2.5	2.7	N/A	2.2	4.4	3.0	2.4	1.2	N/A	1.8	NS	N/A	1.7	4.2
2002 Range	pH (standard units)	6.92 - 7.09		6.14 - 7.20		N/A	7.16 – 7.64		N/A	8.07 - 8.85		N/A	6.93 - 7.53		N/A	6.76 - 7.33	
	Specific Conductance	1690 - 1960		4040 - 4880		N/A	300 – 810		N/A	390 -740		N/A	2280 - 2470		N/A	3770 - 6880	
	Temperature (^{0}C)	10.8 - 20.0		16.2 - 21.1		N/A	10.3 - 14.3		N/A	11.2 - 13.7		N/A	14.4 - 17.1		N/A	15.9 - 19.3	
	TOX (μg/L)	ND		ND		N/A	ND		N/A	ND		N/A	ND		N/A	ND	
	TOC (mg/L)	2.2 - 2.7		1.5 - 2.7		N/A	1.8 – 4.4		N/A	1.2 - 3.5		N/A	1.5 - 2.6		N/A	1.7 - 4.2	

Specific conductance unit = □mhos/cm @ 25 □C; ND = Not Detected; NS = Not Sampled; N/A = Not applicable; TOX = total organic halogens; TOC = total organic carbon

Exceeded Pennsylvania Secondary Drinking Water MCL

Table 14. NETL-PGH 2002 Groundwater Detection Monitoring Program, Results of Analysis - Groundwater Samples, Valley Fill - Contamination Indicator Constituents

	Constituent	Well															
		VFW-1		VFW-1-1	VFW-2		VFW-2-1	VFW-3		VFW-3-1	VFW-4		VFW-5		VFW-5-1	VFW - 6	
Week	Sample Event	Round 1	Round 2	Round 1	Round 1	Round 2	Round 1	Round 1	Round 2	Round 2	Round 1	Round 2	Round 1	Round 2	Round 2	Round 1	Round 2
Week 1	Sample Date	03/06/02	07/10/02	N/A	03/06/02	07/10/02	N/A	03/06/02	07/10/02	N/A	03/06/02	07/10/02	03/06/02	07/10/02	07/10/02	03/06/02	07/10/02
	pH (standard units)	7.83	8.14	N/A	7.19	7.31	N/A	7.30	7.12	N/A	7.00	7.14	7.17	7.33	7.33	7.32	7.50
	Specific Conductance	790	510	N/A	2850	3660	N/A	2280	2260	N/A	2270	2170	2750	3120	3120	4520	3790
	Temperature (^{0}C)	12.6	14.1	N/A	12.2	14.1	N/A	13.1	15.9	N/A	15.1	16.3	13.7	13.8	13.8	11.0	14.2
	TOX (μg/L)	ND	ND	N/A	ND	ND	N/A	ND	ND	N/A	ND	ND	ND	ND	ND	ND	ND
	TOC (mg/L)	4.3	3.8	N/A	2.2	2.6	N/A	2.9	3.2	N/A	1.0	2.4	4.4	4.4	4.3	2.6	3.8
Week 2	Sample Date	04/03/02	08/07/02	04/03/02	04/03/02	08/07/02	04/03/02	04/03/02	08/07/02	N/A	04/03/02	08/07/02	04/03/02	08/07/02	N/A	04/03/02	08/07/02
	pH (standard units)	7.80	8.25	7.80	7.20	7.24	7.20	7.28	7.17	N/A	6.97	7.15	7.33	7.31	N/A	7.27	7.49
	Specific Conductance	970	930	970	2890	3240	2890	1890	2430	N/A	2120	2260	2480	3070	N/A	4480	3910
	Temperature (^{0}C)	12.0	14.2	12.0	10.0	14.9	10.0	12.2	16.2	N/A	13.8	16.8	12.3	14.4	N/A	10.1	15.0
	TOX (μg/L)	ND	ND	ND	ND	ND	ND	ND	ND	N/A	ND	ND	ND	ND	N/A	ND	ND
	TOC (mg/L)	4.8	3.2	4.0	3.1	3.3	3.1	1.9	3.3	N/A	2.7	2.1	5.2	4.1	N/A	3.1	3.6
Week 3	Sample Date	05/08/02	09/11/02	N/A	05/08/02	09/11/02	N/A	05/08/02	09/11/02	09/11/02	05/08/02	09/11/02	05/08/02	09/11/02	N/A	05/08/02	09/11/02
	pH (standard units)	7.36	8.20	N/A	7.35	6.99	N/A	7.32	6.89	6.89	6.92	6.86	7.29	6.98	N/A	6.95	7.38
	Specific Conductance	900	1070	N/A	2860	2930	N/A	1910	2300	2300	2130	2350	2860	3060	N/A	4110	3900
	Temperature (^{0}C)	13.9	14.6	N/A	12.0	15.8	N/A	12.0	16.6	16.6	16.4	17.2	14.2	15.2	N/A	12.7	16.4
	TOX (μg/L)	ND	ND	N/A	ND	ND	N/A	ND	ND	ND	ND	ND	ND	ND	N/A	ND	ND
	TOC (mg/L)	3.6	6.2	N/A	3.1	4.2	N/A	3.2	5.2	5.4	3.7	75	4.7	4.5	N/A	3.8	4.1
Week 4	Sample Date	06/05/02	10/10/02	N/A	06/05/02	10/10/02	N/A	06/05/02	10/10/02	N/A	06/05/02	10/10/02	06/05/02	10/10/02	N/A	06/05/02	10/10/02
	pH (standard units)	7.72	7.97	N/A	6.75	6.68	N/A	7.02	6.55	N/A	6.67	6.67	7.00	7.34	N/A	7.09	6.99
	Specific Conductance	1050	1130	N/A	3750	2720	N/A	2120	2200	N/A	2200	2320	3010	2880	N/A	3920	3680
	Temperature (^{0}C)	14.8	15.0	N/A	13.8	15.2	N/A	16.4	15.1	N/A	16.4	16.5	14.9	16.5	N/A	13.8	16.3
	TOX (μg/L)	ND	ND	N/A	ND	ND	N/A	ND	ND	N/A	ND	ND	ND	ND	N/A	ND	ND
	TOC (mg/L)	2.7	8.5	N/A	2.3	5.5	N/A	2.9	4.5	N/A	2.0	6.3	3.8	7.4	N/A	3.5	3.9
2002 Range	pH (standard units)	7.36 – 8.25		N/A	6.68 - 7.35		N/A	6.55 – 7.32		N/A	6.67 - 7.15		6.98 - 7.34		N/A	6.95 – 7.50	
	Specific Conductance	510 – 1130		N/A	2720 – 3750		N/A	1890 - 2430		N/A	2120 – 2350		2480 – 3120		N/A	3680 – 4520	
	Temperature (^{0}C)	12.0 - 15.0		N/A	10.0 - 15.8		N/A	12.0 - 16.6		N/A	13.8 - 17.2		12.3 – 16.5		N/A	10.1 - 16.4	
	TOX (μg/L)	ND		N/A	ND		N/A	ND		N/A	ND		ND		N/A	ND	
	TOC (mg/L)	2.7 – 8.5		N/A	2.2 – 5.5		N/A	1.9 – 5.2		N/A	1.0 – 75		4.1 – 7.4		N/A	2.6 - 4.1	

Specific conductance unit = μmhos/cm @ 25 □C; ND=Not Detected; N/A = not applicable; TOX = total organic halogens; TOC = total organic carbon.

Table 14. NETL-PGH 2002 Groundwater Detection Monitoring Program, Results of Analysis - Groundwater Samples, Valley Fill – Contamination Indicator Constituents (continued)

	Constituents	Well															
		VFW-7		VFW-7-1	VFW-9		VFW-10		VFW-10-1	VFW-11		VFW-11-1	VFW-12		VFW-12-1	VFW-14	
Week	Sample Event	Round 1	Round 2	Round 1	Round 1	Round 2	Round 1	Round 2	Round 2	Round 1	Round 2	Round 2	Round 1	Round 2	Round 1	Round 1	Round 2
Week 1	**Sample Date**	03/06/02	07/10/02	N/A	03/06/02	07/10/02	03/06/02	07/10/02	N/A	03/06/02	07/10/02	N/A	03/06/02	07/10/02	N/A	03/06/02	07/10/02
	pH (standard units)	6.94	7.10	N/A	7.23	7.25	6.98	7.16	N/A	7.11	7.40	N/A	7.14	7.26	N/A	7.05	7.09
	Specific Conductance	7800	4570	N/A	570	1370	2320	2150	N/A	1990	1880	N/A	2120	1920	N/A	2610	2860
	Temperature (^{0}C)	13.0	14.8	N/A	10.8	13.6	12.8	14.1	N/A	12.5	12.9	N/A	11.7	13.1	N/A	13.1	14.1
	TOX (μg/L)	ND	ND	N/A	ND	ND	ND	ND	N/A	ND	ND	N/A	ND	ND	N/A	ND	ND
	TOC (mg/L)	2.3	2.9	N/A	1.6	2.2	4.2	2.7	N/A	1.1	2.6	N/A	4.2	7.4	N/A	4.4	3.9
Week 2	**Sample Date**	04/03/02	08/07/02	N/A	04/03/02	08/07/02	04/03/02	08/07/02	08/07/02	04/03/02	08/07/02	N/A	04/03/02	08/07/02	N/A	04/03/02	08/07/02
	pH (standard units)	6.96	7.04	N/A	7.54	7.25	7.19	7.13	7.13	7.32	7.30	N/A	7.28	7.09	N/A	7.09	7.07
	Specific Conductance	2210	2630	N/A	520	1400	2020	2200	2200	1820	2050	N/A	1880	2170	N/A	2470	2940
	Temperature (^{0}C)	10.7	14.3	N/A	8.3	14.2	11.0	14.8	14.8	10.8	13.4	N/A	10.0	13.8	N/A	11.6	14.6
	TOX (μg/L)	ND	ND	N/A	ND	ND	ND	ND	ND	ND	ND	N/A	ND	ND	N/A	ND	ND
	TOC (mg/L)	2.6	2.8	N/A	2.1	1.5	3.9	2.8	3.0	2.2	2.8	N/A	6.9	7.2	N/A	3.5	3.7
Week 3	**Sample Date**	05/08/02	09/11/02	N/A	05/08/02	09/11/02	05/08/02	09/11/02	N/A	05/08/02.0	09/11/02	N/A	05/08/02	09/11/02	05/08/02	05/08/02	09/11/02
	pH (standard units)	6.63	6.90	N/A	6.99	7.01	6.72	7.03	N/A	6.98	7.18	N/A	6.79	6.80	6.79	6.85	6.83
	Specific Conductance	3010	4450	N/A	1080	1150	2160	2200	N/A	1670	2020	N/A	1840	2390	1840	2610	2970
	Temperature (^{0}C)	13.3	14.8	N/A	11.1	14.0	12.6	16.9	N/A	12.0	13.9	N/A	11.8	14.6	11.8	14.0	14.9
	TOX (μg/L)	ND	ND	N/A	ND	ND	ND	ND	N/A	ND	ND	N/A	ND	ND	ND	ND	ND
	TOC (mg/L)	3.1	3.6	N/A	2.0	2.3	4.3	4.1	N/A	2.6	2.8	N/A	7.3	7.1	7.0	3.9	4.1
Week 4	**Sample Date**	06/05/02	10/10/02	06/05/02	06/05/02	10/10/02	06/05/02	10/10/02	N/A	06/05/02	10/10/02	10/10/02	06/05/02	10/10/02	N/A	06/05/02	10/10/02
	pH (standard units)	6.67	6.62	6.67	6.83	6.76	6.80	6.63	N/A	7.07	6.87	6.87	6.89	6.55	N/A	6.81	6.53
	Specific Conductance	4610	2720	4610	1310	1410	1900	2340	N/A	1890	1770	1770	1950	2460	N/A	2840	2970
	Temperature (^{0}C)	15.1	13.4	15.1	13.6	20.0	13.7	15.3	N/A	13.7	13.0	13.0	12.7	14.0	N/A	14.6	14.6
	TOX (μg/L)	ND	ND	ND	ND	ND	ND	ND	N/A	ND	ND	ND	ND	ND	N/A	ND	ND
	TOC (mg/L)	2.3	4.7	2.4	1.5	3.1	3.2	5.3	N/A	2.6	3.2	4.0	6.8	5.7	N/A	3.4	5.8
2002 Range	pH (standard unit)	6.62 - 7.10		N/A	6.76 – 7.54		6.63 – 7.19		N/A	6.87 – 7.40		N/A	6.55 – 7.28		N/A	6.53 – 7.09	
	Specific Conductance	2210 – 7800		N/A	520 – 1410		1900 – 2340		N/A	1670 – 2050		N/A	1840 – 2460		N/A	2470 – 2970	
	Temperature (^{0}C)	10.7 – 15.1		N/A	8.3 – 20.0		11.0 – 16.9		N/A	10.8 – 13.9		N/A	10.0 – 14.6		N/A	11.6 – 14.9	
	TOX (μg/L)	ND		N/A	ND		ND		N/A	ND		N/A	ND		N/A	ND	
	TOC (mg/L)	2.3 – 4.7		N/A	1.5 – 3.1		2.7 – 5.3		N/A	1.1 – 3.2		N/A	4.2 – 7.4		N/A	3.4 – 5.8	

Specific conductance unit = μmhos/cm @ 25 □C; ND = Not Detected; N/A = not applicable; TOX = total organic halogens; TOC = total organic carbon.

Table 15. NETL-PGH 2002 Groundwater Detection Monitoring Program, Results of Analysis - Groundwater Samples, Main Plateau - Groundwater Characteristics Constituents

Constituent Sample Date	Well Number and Sample Date												
	MPW-1		MPW-2		MPW-2-1	MPW-4		MPW-4-1	MPW-4D		MPW-4D-1	MPW-7	
	05/09/02	10/10/02	05/09/02	10/10/02	05/09/02 & 10/10/02	05/09/02	10/10/02	05/09/02	05/09/02 & 07/10/02	10/10/02	05/09/02 & 10/10/02	05/09/02	10/08/02
Inorganics (μg/L)													
Aluminum	ND	ND	ND	ND	ND	ND	ND	N/A	ND	ND	ND	ND	ND
Boron	ND	ND	ND	ND	ND	ND	ND	N/A	ND	ND	ND	ND	ND
Calcium	240000	300000	760000	380000	770000	NS	210000	N/A	4100	9300	6800	150000	92000
Iron	3300	ND	ND	ND	ND	ND	390	N/A	ND	ND	ND	ND	ND
Magnesium	130000	170000	92000	85000	90000	97000	80000	N/A	740	1300	1000	21000	11000
Manganese	250	48	1300	1500	1100	37	260	N/A	ND	ND	ND	31	ND
Nickel	390	520	ND	ND	ND	520	640	N/A	ND	110	110	760	180
Phosphorus	130	NS	ND	Ns	N/A	ND	NS	N/A	ND	NS	NS	96	NS
Potassium	3600	3600	4300	3000	4300	4700	3100	N/A	1100	ND	ND	5800	5300
Silicon	3000	3200	3200	3400	3200	3200	3400	N/A	3000	3500	3500	3400	4800
Sodium	78000	100000	490000	240000	500000	110000	96000	N/A	240000	210000	210000	170000	88000
Strontium	980	1200	690	63	670	850	780	N/A	110	140	140	370	200
Quality Parameters (mg/L)													
Chloride	1400	890	1100	1100	1100	660	510	N/A	92	97	89	420	130
Fluoride	0.12	0.090	0.065	0.12	N/A	1.6	0.86	N/A	1.6	1.3	1.6	0.23	0.20
Nitrate	0.16	0.18	0.83	0.70	N/A	ND	0.14	0.36	0.13	0.25	0.22	1.1	2.2
Sulfate	180	340	170	180	160	170	130	N/A	21	18	20	230	130
Total Dissolved Solids	1600	NS	3000	NS	N/A	1800	NS	N/A	570	NS	N/A	2900	NS
Total Alkalinity (Bicarbonate)	230	230	160	170	170	220	220	N/A	340	370	330	150	210
Total Alkalinity (Carbonate)	ND	ND	ND	ND	ND	ND	ND	N/A	ND	ND	ND	ND	ND

N/A = not applicable; NS = not sampled; ND = not detected.

	Exceeded Pennsylvania Secondary Drinking Water MCL
	Exceeded Pennsylvania Secondary Drinking Water MCL and Act 2 Secondary Maximum Contaminant Level
	Exceeded Pennsylvania Secondary Drinking Water MCL, Act 2 Secondary Maximum Contaminant Level, and EPA Region III Risk Based Table
	Exceeded EPA Region III Risk Based Table

Table 15. NETL-PGH 2002 Groundwater Detection Monitoring Program, Results of Analysis - Groundwater Samples, Main Plateau - Groundwater Characteristics Constituents (continued)

Constituent / Sample Date	Well Number and Sample Date												
	MPW-7D		MPW-8		MPW-9		MPW-9-1	MPW-10		MPW-11		MPW-12	
	05/09/02	10/08/02	05/09/02	10/08/02	05/09/02	10/08/02	05/09/02	05/09/02	10/08/02	05/09/02	10/10/02	05/09/02	10/08/02
Inorganics (μg/L)													
Aluminum	NS	NS	ND	ND	ND	ND	N/A	ND	ND	ND	NS	ND	ND
Boron	NS	NS	ND	ND	ND	ND	N/A	ND	ND	ND	NS	ND	ND
Calcium	NS	NS	NS	NS	61000	47000	N/A	2700	1800	210000	NS	360000	470000
Iron	NS	NS	2000	1100	ND	ND	N/A	ND	ND	ND	NS	ND	ND
Magnesium	NS	NS	110000	100000	16000	12000	N/A	500	ND	50000	NS	62000	68000
Manganese	NS	NS	580	97	60	54	N/A	ND	ND	34	NS	100	110
Nickel	NS	NS	3800	810	300	410	N/A	ND	ND	130	NS	ND	ND
Phosphorus	NS	NS	87	NS	ND	NS	N/A	ND	NS	ND	NS	ND	NS
Potassium	NS	NS	7300	5700	1300	1100	N/A	ND	ND	4700	NS	4800	3800
Silicon	NS	NS	2300	2900	3000	3200	N/A	3300	3700	2800	NS	3000	3400
Sodium	NS	NS	300000	230000	91000	97000	N/A	160000	170000	180000	NS	310000	460000
Strontium	NS	NS	950	920	1700	1500	N/A	79	70	490	NS	660	810
Quality Parameters (mg/L)													
Chloride	NS	NS	1300	1100	83	77	N/A	61	62	560	NS	2200	1800
Fluoride	NS	NS	0.087	0.082	0.13	0.15	N/A	0.35	0.38	0.17	NS	0.10	0.10
Nitrate	NS	NS	0.18	0.28	0.23	0.22	N/A	ND	ND	1.6	NS	1.4	1.1
Sulfate	NS	NS	190	180	50	68	N/A	17	9.8	300	NS	260	240
Total Dissolved Solids	NS	NS	2900	NS	480	NS	470	470	NS	1700	NS	5000	NS
Total Alkalinity (Bicarbonate)	NS	NS	99	100	260	290	N/A	300	320	120	NS	130	150
Total Alkalinity (Carbonate)	NS	NS	ND	ND	ND	ND	N/A	2.3	17	ND	NS	ND	ND

N/A = not applicable; NS = not sampled; ND = not detected.

	Exceeded Pennsylvania Secondary Drinking Water MCL
	Exceeded Pennsylvania Secondary Drinking Water MCL and Act 2 Secondary Maximum Contaminant Level
	Exceeded Pennsylvania Secondary Drinking Water MCL, Act 2 Secondary Maximum Contaminant Level, and Exceeded EPA Region III Risk Based Table
	Exceeded EPA Region III Risk Based Table

Table 16. NETL-PGH 2002 Groundwater Detection Monitoring Program, Results of Analysis - Groundwater Samples, Valley Fill - Groundwater Characteristics Constituents

Constituent Sample Date	Well Number and Sample Date															
	VFW-1		VFW-2		VFW-2-1	VFW-3		VFW-4		VFW-4-1	VFW-5		VFW-5-1	VFW-6		VFW-6-1
	05/08/02 & 07/10/02	10/10/02	05/08/02 & 07/10/02	10/10/02	05/08/02	05/08/02 & 07/10/02	10/10/02	05/08/02 & 07/10/02	10/10/02	07/10/02	05/08/02 & 07/10/02	10/10/02	05/8/02 & 10/10/02	05/08/02 & 07/10/02	10/10/02	05/08/02
Inorganics (μg/L)																
Aluminum	ND	ND	ND	ND	N/A	ND	ND	ND	ND	N/A	ND	ND	ND	ND	ND	ND
Boron	ND	ND	ND	ND	N/A	ND	ND	ND	ND	N/A	ND	ND	ND	ND	ND	ND
Calcium	7100	3500	450000	330000	N/A	190000	210000	260000	260000	N/A	240000	250000	240000	320000	270000	320000
Iron	ND	ND	1600	1700	N/A	ND	ND	ND	ND	N/A	ND	ND	ND	550	590	580
Magnesium	2600	1000	94000	71000	N/A	73000	91000	87000	94000	N/A	33000	33000	34000	50000	58000	50000
Manganese	ND	ND	1600	1400	N/A	18	69	56	16	N/A	ND	ND	ND	470	490	490
Nickel	ND	ND	ND	ND	N/A	330	400	160	200	N/A	ND	ND	ND	ND	ND	ND
Phosphorus	ND	NS	26	NS	N/A	55	NS	ND	NS	N/A	24	NS	NS	59	NS	N/A
Potassium	1800	ND	5900	4500	N/A	4700	4100	4200	3700	N/A	6500	4300	4400	18000	13000	18000
Silicon	4200	3800	6000	8700	N/A	3200	4400	3800	4800	N/A	7600	8000	8100	3600	5900	3700
Sodium	220000	280000	180000	200000	N/A	87000	96000	33000	24000	N/A	350000	340000	330000	630000	420000	630000
Strontium	400	220	4200	3200	N/A	880	990	2200	1800	N/A	600	520	510	1300	1000	1300
Quality Parameters (mg/L)																
Chloride	44	61	780	340	N/A	460	450	510	520	N/A	700	650	700	1300	850	N/A
Fluoride	1.9	2.2	0.61	0.86	N/A	0.21	0.20	0.17	0.14	N/A	0.79	0.60	0.80	0.75	0.74	N/A
Nitrate	ND	ND	ND	ND	N/A	0.072	0.98	0.12	0.14	0.12	0.34	0.59	N/A	ND	ND	N/A
Sulfate	2.2	ND	740	910	N/A	140	140	100	84	N/A	360	330	340	410	440	N/A
Total Dissolved Solids	650	NS	2900	NS	2900	1400	NS	1600	NS	N/A	2100	NS	N/A	3400		N/A
Total Alkalinity (Bicarbonate)	550	640	200	260	N/A	280	360	310	350	N/A	210	300	200	81	110	N/A
Total Alkalinity (Carbonate)	ND	ND	ND	ND	N/A	ND	ND	ND	ND	N/A	ND	ND	ND	ND	ND	N/A

N/A = not applicable; NS = not sampled; ND = not detected.

	Exceeded Pennsylvania Secondary Drinking Water MCL
	Exceeded Pennsylvania Secondary Drinking Water MCL and Act 2 Secondary Maximum Contaminant Level
	Exceeded Pennsylvania Secondary Drinking Water MCL, Act 2 Secondary MCL, and EPA Region III Risk Table
	Exceeded Pennsylvania Primary Drinking Water MCL and Act 2 Secondary Maximum Contaminant Level

Table 16. NETL-PGH 2002 Groundwater Detection Monitoring Program, Results of Analysis - Groundwater Samples, Valley Fill - Groundwater Characteristics Constituents (continued)

Constituent Sample Date	VFW-7		VFW 9		VFW-10		VFW-10-1	VFW-11		VFW-12		VFW-12-1	VFW-14	
	05/08/02 & 07/10/02	10/10/02	05/08/02 & 07/10/02	10/10/02	05/08/02 & 07/10/02	10/10/02	10/10/02	05/08/02 & 07/10/02	10/10/02	05/08/02 & 07/10/02	10/10/02	10/10/02	05/08/02 & 07/10/02	10/10/02
Inorganics (μg/L)														
Aluminum	ND	ND	ND	NS	ND	ND	N/A	ND	ND	ND	ND	N/A	ND	ND
Boron	ND	ND	ND	NS	ND	ND	N/A	ND	ND	ND	310	N/A	ND	ND
Calcium	360000	350000	130000	190000	280000	230000	N/A	230000	250000	220000	250000	N/A	290000	310000
Iron	2500	1600	ND	ND	ND	ND	N/A	ND	ND	ND	ND	N/A	320	ND
Magnesium	83000	81000	25000	39000	55000	43000	N/A	59000	61000	61000	71000	N/A	60000	72000
Manganese	1400	1400	160	51	1800	2200	N/A	130	96	54	270	N/A	1100	2800
Nickel	ND	ND	510	750	49	70	N/A	520	260	900	740	N/A	ND	ND
Phosphorus	ND	NS	89	NS	450	NS	N/A	270	NS	ND	NS	N/A	160	NS
Potassium	7500	5300	2300	2400	7500	9600	N/A	2800	2400	4300	4000	N/A	4400	3400
Silicon	4500	4800	2700	3200	5200	6600	N/A	2700	3300	3500	5200	N/A	5200	5900
Sodium	390000	410000	46000	37000	150000	220000	N/A	76000	91000	140000	180000	N/A	200000	170000
Strontium	4200	3800	380	310	540	470	N/A	1000	890	1800	2000	N/A	1500	1500
Quality Parameters (mg/L)														
Chloride	1300	1200	250	300	370	380	N/A	470	490	360	490	490	630	730
Fluoride	0.086	0.14	0.090	0.12	0.38	0.97	N/A	0.10	0.12	0.39	0.39	N/A	0.18	0.17
Nitrate	ND	ND	0.79	0.99	1.8	0.70	0.65	ND	0.10	0.84	0.18	N/A	ND	0.076
Sulfate	130	120	150	150	540	390	N/A	120	120	340	270	260	300	260
Total Dissolved Solids	3300	NS	890	NS	1700	NS	N/A	1500	NS	1500	NS	N/A	2100	NS
Alkalinity (Bicarbonate)	210	240	110	160	230	270	N/A	180	220	300	390	380	230	270
Alkalinity (Carbonate)	ND	ND	ND	ND	ND	ND	N/A	ND	ND	ND	ND	ND	ND	ND

N/A = not applicable; NS = not sampled; ND = not detected.

	Exceeded Pennsylvania Secondary Drinking Water MCL
	Exceeded Pennsylvania Secondary Drinking Water MCL and Act 2 Secondary Maximum Contaminant Level
	Exceeded Pennsylvania Secondary Drinking Water MCL, Act 2 Secondary Maximum Contaminant Level, and EPA Region III Risk Based Table
	Exceeded EPA Region III Risk Based Table

Table 17. NETL-PGH 2002 Groundwater Detection Monitoring Program, Results of Analysis - Groundwater Samples, Main Plateau - Semivolatile Organic Compounds Constituents (μg/L)

Constituent Sample Date	Well Number and Sample Date				
	MPW-1		MPW-1-1	MPW-7	
	05/09/02	10/10/02	05/09/02	05/09/02	10/08/02
1,2,4-Trichlorobenzene	ND	NS	ND	ND	ND
1,2-Dichlorobenzene	ND	NS	ND	ND	ND
1,3-Dichlorobenzene	ND	NS	ND	ND	ND
1,4-Dichlorobenzene	ND	NS	ND	ND	ND
2,4,5-Trichlorophenol	ND	NS	ND	ND	ND
2,4,6-Trichlorophenol	ND	NS	ND	ND	ND
2,4-Dichlorophenol	ND	NS	ND	ND	ND
2,4-Dimethylphenol	ND	NS	ND	ND	ND
2,4-Dinitrophenol	ND	NS	ND	ND	ND
2,4-Dinitrotoulene	ND	NS	ND	ND	ND
2,6-Dinitrotoluene	ND	NS	ND	ND	ND
2-Chloronaphthalene	ND	NS	ND	ND	ND
2-Chlorophenol	ND	NS	ND	ND	ND
2-Methylnaphthalene	ND	NS	ND	ND	ND
2-Methylphenol (o-Cresol)	ND	NS	ND	ND	ND
2-Nitroaniline	ND	NS	ND	ND	ND
2-Nitrophenol	ND	NS	ND	ND	ND
3,3'-Dichlorobenzidine	ND	NS	ND	ND	ND
3-Nitroaniline	ND	NS	ND	ND	ND
4,6-Dinitro-2-methlyphenol	ND	NS	ND	ND	ND
4-Bromophenyl phenyl ether	ND	NS	ND	ND	ND
4-Chloro-3-methylphenol	ND	NS	ND	ND	ND
4-Chloroaniline	ND	NS	ND	ND	ND
4-Chlorodiphenyl ether	ND	NS	ND	ND	ND
4-Methylphenol (p-Cresol)	ND	NS	ND	ND	ND
4-Nitroaniline	ND	NS	ND	ND	ND
4-Nitrophenol	ND	NS	ND	ND	ND
Acenaphthene	ND	NS	ND	ND	ND
Acenaphthylene	ND	NS	ND	ND	ND
Anthracene	ND	NS	ND	ND	ND
Benzo(a)anthracene	ND	NS	ND	ND	ND
Benzo(a)pyrene	ND	NS	ND	ND	ND

ND = not detected, NS = no sampled

Table 17. NETL-PGH 2002 Groundwater Detection Monitoring Program, Results of Analysis - Groundwater Samples, Main Plateau - Semivolatile Organic Compounds Constituents (μg/L)
(continued)

Constituent Sample Date	Well Number and Sample Date				
	MPW-1		MPW-1-1	MPW-7	
	05/09/02	10/10/02	05/09/02	05/09/02	10/08/02
Benzo(b)fluoranthene	ND	NS	ND	ND	ND
Benzo(ghi)perylene	ND	NS	ND	ND	ND
Benzo(k)fluoranthene	ND	NS	ND	ND	ND
Bis(2-chloroethoxyl) methane	ND	NS	ND	ND	ND
Bis (2-chloroethyl) ether	ND	NS	ND	ND	ND
Bis(2-chloroisopropyl) ether	ND	NS	ND	ND	ND
Bis(2-ethylhexyl) phthalate	ND	NS	ND	ND	ND
Butyl benzyl phthalate	ND	NS	ND	ND	ND
Carbazole	ND	NS	ND	ND	ND
Chrysene	ND	NS	ND	ND	ND
Di-n-butyl phthalate	ND	NS	ND	ND	ND
Di-n-octly phthalate	ND	NS	ND	ND	ND
Dibenzo(a,h)anthracene	ND	NS	ND	ND	ND
Dibenzofuran	ND	NS	ND	ND	ND
Diethyl phthalate	ND	NS	ND	ND	ND
Dimethyl phthalate	ND	NS	ND	ND	ND
Fluoranthene	ND	NS	ND	ND	ND
Fluorene	ND	NS	ND	ND	ND
Hexachlorobenzene	ND	NS	ND	ND	ND
Hexachlorobutadiene	ND	NS	ND	ND	ND
Hexachlorocyclopentadiene	ND	NS	ND	ND	ND
Hexachloroethane	ND	NS	ND	ND	ND
Indeno(1,2,3-cd)pyrene	ND	NS	ND	ND	ND
Isophorone	ND	NS	ND	ND	ND
N-Nitroso-Di-n-propylamine	ND	NS	ND	ND	ND
N-nitrosodiphenylamine	ND	NS	ND	ND	ND
Naphthalene	ND	NS	ND	ND	ND
Nitrobenzene	ND	NS	ND	ND	ND
Pentachlorophenol	ND	NS	ND	ND	ND
Phenanthrene	ND	NS	ND	ND	ND
Phenol	ND	NS	ND	ND	ND
Pyrene	ND	NS	ND	ND	ND

ND = not detected, NS = not sampled

Table 18. NETL-PGH 2002 Groundwater Detection Monitoring Program, Results of Analysis - Groundwater Samples, Valley Fill - Semivolatile Organic Compounds Constituents (µg/L)

Constituent Sample Date	Well Number and Sample Date				
	VFW-2		VFW-2-1	VFW-14	
	06/05/02	10/10/02	10/10/02	05/08/02	10/10/02
1,2,4-Trichlorobenzene	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND	ND	ND
2,4,5-Trichlorophenol	ND	ND	ND	ND	ND
2,4,6-Trichlorophenol	ND	ND	ND	ND	ND
2,4-Dichlorophenol	ND	ND	ND	ND	ND
2,4-Dimethylphenol	ND	ND	ND	ND	ND
2,4-Dinitrophenol	ND	ND	ND	ND	ND
2,4-Dinitrotoulene	ND	ND	ND	ND	ND
2,6-Dinitrotoluene	ND	ND	ND	ND	ND
2-Chloronaphthalene	ND	ND	ND	ND	ND
2-Chlorophenol	ND	ND	ND	ND	ND
2-Methylnaphthalene	ND	ND	ND	ND	ND
2-Methylphenol (o-Cresol)	ND	ND	ND	ND	ND
2-Nitroaniline	ND	ND	ND	ND	ND
2-Nitrophenol	ND	ND	ND	ND	ND
3,3'-Dichlorobenzidine	ND	ND	ND	ND	ND
3-Nitroaniline	ND	ND	ND	ND	ND
4,6-Dinitro-2-methlyphenol	ND	ND	ND	ND	ND
4-Bromophenyl phenyl ether	ND	ND	ND	ND	ND
4-Chloro-3-methylphenol	ND	ND	ND	ND	ND
4-Chloroaniline	ND	ND	ND	ND	ND
4-Chlorodiphenyl ether	ND	ND	ND	ND	ND
4-Methylphenol (p-Cresol)	ND	ND	ND	ND	ND
4-Nitroaniline	ND	ND	ND	ND	ND
4-Nitrophenol	ND	ND	ND	ND	ND
Acenaphthene	ND	ND	ND	ND	ND
Acenaphthylene	ND	ND	ND	ND	ND
Anthracene	ND	ND	ND	ND	ND
Benzo(a)anthracene	ND	ND	ND	ND	ND
Benzo(a)pyrene	ND	ND	ND	ND	ND

ND = not detected.

Table 18. NETL-PGH 2002 Groundwater Detection Monitoring Program, Results of Analysis - Groundwater Samples, Valley Fill - Semivolatile Organic Compounds Constituents (µg/L) (continued)

Constituent Sample Date	Well Number and Sample Date				
	VFW-2		VFW-2-1	VFW-14	
	06/05/02	10/10/02	10/10/02	05/08/02	10/10/02
Benzo(b)fluoranthene	ND	ND	ND	ND	ND
Benzo(ghi)perylene	ND	ND	ND	ND	ND
Benzo(k)fluoranthene	ND	ND	ND	ND	ND
Bis(2-chloroethoxyl) methane	ND	ND	ND	ND	ND
Bis (2-chloroethyl) ether	ND	ND	ND	ND	ND
Bis(2-chloroisopropyl) ether	ND	ND	ND	ND	ND
Bis(2-ethylhexyl) phthalate	ND	ND	ND	ND	ND
Butyl benzyl phthalate	ND	ND	ND	ND	ND
Carbazole	ND	ND	ND	ND	ND
Chrysene	ND	ND	ND	ND	ND
Di-n-butyl phthalate	ND	ND	ND	ND	ND
Di-n-octly phthalate	ND	ND	ND	ND	ND
Dibenzo(a,h)anthracene	ND	ND	ND	ND	ND
Dibenzofuran	ND	ND	ND	ND	ND
Diethyl phthalate	ND	ND	ND	ND	ND
Dimethyl phthalate	ND	ND	ND	ND	ND
Fluoranthene	ND	ND	ND	ND	ND
Fluorene	ND	ND	ND	ND	ND
Hexachlorobenzene	ND	ND	ND	ND	ND
Hexachlorobutadiene	ND	ND	ND	ND	ND
Hexachlorocyclopentadiene	ND	ND	ND	ND	ND
Hexachloroethane	ND	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene	ND	ND	ND	ND	ND
Isophorone	ND	ND	ND	ND	ND
N-Nitroso-Di-n-propylamine	ND	ND	ND	ND	ND
N-nitrosodiphenylamine	ND	ND	ND	ND	ND
Naphthalene	ND	ND	ND	ND	ND
Nitrobenzene	ND	ND	ND	ND	ND
Pentachlorophenol	ND	ND	ND	ND	ND
Phenanthrene	ND	ND	ND	ND	ND
Phenol	ND	ND	ND	ND	ND
Pyrene	ND	ND	ND	ND	ND

ND = not detected

Table 19. NETL-PGH 2002 Groundwater Detection Monitoring Program, Results of Analysis - Groundwater Samples, Valley Fill - TPH Constituents (mg/L)

.. Constituent	Well Number and Sample Date								
	VFW-2		VFW-4		VFW-7		VFW-7-1	VFW-9	
Sample Date	05/08/02	10/10/02	05/08/02	10/10/02	05/08/02	10/10/02	05/08/02	05/08/02	10/10/02
TPH-DRO	ND	ND	ND	ND	ND	ND	ND	ND	ND
Constituent	**Well Number and Sample Date**								
	VFW-10		VFW-11		VFW-12		VFW-12-1	VFW-14	
Sample Date	05/08/02	10/10/02	05/08/02	10/10/02	05/08/02	10/10/02	10/10/02	05/08/02	10/10/02
TPH-DRO	ND	ND	ND	ND	ND	ND	NS	ND	ND

ND = not detected; NS = not sampled; TPH = total petroleum hydrocarbons; TPH-DRO = total petroleum hydrocarbons - diesel range organics

Table 20. NETL-PGH 2002 Groundwater Detection Monitoring Program, Results of Analysis - Groundwater Samples, Main Plateau - Volatile Organic Compounds Constituents (µg/L)

Constituent Sample Date	Well Number and Sample Date										
	MPW-1		MPW-7		MPW-7D		MPW-8		MPW-8-1	MPW-9	
	05/09/02	10/10/02	05/09/02	10/08/02	05/09/02	10/08/02	05/09/02	10/08/02	05/09/02	05/09/02	10/08/02
1,1,1-Trichloroethane	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND
1,1-Dichloroethane	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND
1,1-Dichloroethene	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND
1,2-Dichloroethane	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND
1,2-Dichloropropane	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND
2-Butanone (MEK)	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND
2-Hexanone	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND
4-Methyl-2-pentanone (MIBK)	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND
Acetone	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND
Benzene	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND
Bromodichloromethane	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND
Bromoform	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND
Bromomethane	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND
Carbon Disulfide	10	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND
Carbon Tetrachloride	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND
Chlorobenzene	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND
Chloroethane	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND
Chloroform	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND
Chloromethane	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND
cis-1,3-Dichloropropene	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND
Dibromochloromethane	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND
Ethylbenzene	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND
Methylene chloride	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND
Styrene	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND
Tetrachloroethene	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND
Toulene	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND
Total Xylenes	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	ND	38	5.8	ND	NS	NS	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND
Trichloroethene	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND
Vinyl chloride	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND

ND = not detected; NS = not sampled; MEK = methyl ethyl ketone; MIBK = methyl isobutyl ketone.

Table 20. NETL-PGH 2002 Groundwater Detection Monitoring Program, Results of Analysis - Groundwater Samples, Main Plateau - Volatile Organic Compounds Constituents (µg/L) (continued)

Constituent Sample Date	Well Number and Sample Date					
	MPW-10		MPW-11		MPW-12	
	05/09/02	10/08/02	05/09/02	10/10/02	05/09/02	10/10/02
1,1,1-Trichloroethane	ND	ND	ND	NS	ND	NS
1,1,2,2-Tetrachloroethane	ND	ND	ND	NS	ND	NS
1,1,2-Trichloroethane	ND	ND	ND	NS	ND	NS
1,1-Dichloroethane	ND	ND	ND	NS	ND	NS
1,1-Dichloroethene	ND	ND	ND	NS	ND	NS
1,2-Dichloroethane	ND	ND	ND	NS	ND	NS
1,2-Dichloropropane	ND	ND	ND	NS	ND	NS
2-Butanone (MEK)	ND	ND	ND	NS	ND	NS
2-Hexanone	ND	ND	ND	NS	ND	NS
4-Methyl-2-pentanone (MIBK)	ND	ND	ND	NS	ND	NS
Acetone	ND	ND	ND	NS	ND	NS
Benzene	ND	ND	ND	NS	ND	NS
Bromodichloromethane	ND	ND	ND	NS	ND	NS
Bromoform	ND	ND	ND	NS	ND	NS
Bromomethane	ND	ND	ND	NS	ND	NS
Carbon Disulfide	ND	ND	ND	NS	ND	NS
Carbon Tetrachloride	ND	ND	ND	NS	ND	NS
Chlorobenzene	ND	ND	ND	NS	ND	NS
Chloroethane	ND	ND	ND	NS	ND	NS
Chloroform	ND	ND	11	NS	ND	NS
Chloromethane	ND	ND	ND	NS	ND	NS
cis-1,2-Dchloroethene	ND	ND	ND	NS	ND	NS
cis-1,3-Dichloropropene	ND	ND	ND	NS	ND	NS
Dibromochloromethane	ND	ND	ND	NS	ND	NS
Ethylbenzene	ND	ND	ND	NS	ND	NS
Methylene chloride	ND	ND	ND	NS	ND	NS
Styrene	ND	ND	ND	NS	ND	NS
Tetrachloroethene	ND	ND	ND	NS	ND	NS
Toulene	ND	ND	ND	NS	ND	NS
Total Xylenes	ND	ND	ND	NS	ND	NS
trans-1,2-Dichloroethene	ND	ND	ND	NS	ND	NS
trans-1,3-Dichloropropene	ND	ND	ND	NS	ND	NS
Trichloroethene	ND	ND	ND	NS	ND	NS
Vinyl chloride	ND	ND	ND	NS	ND	NS

ND = not detected; NS = not sampled; MEK = methyl ethyl ketone; MIBK = methyl isobutyl ketone.

	Exceeded EPA Region III Risk-Based Table

Table 21. NETL-PGH 2002 Groundwater Detection Monitoring Program
Results of Analysis - Groundwater Samples, Valley Fill - Volatile Organic Compounds Constituents (µg/L)

Constituent Sample Date	Well Number and Sample Date								
	VFW-2		VFW-3		VFW-3-1	VFW-10		VFW-14	
	05/08/02	10/10/02	05/08/02	10/10/02	10/10/02	05/08/02	10/10/02	05/08/02	10/10/02
1,1,1-Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Butanone (MEK)	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Hexanone	ND	ND	ND	ND	ND	ND	ND	ND	ND
4-Methyl-2-pentanone (MIBK)	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acetone	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromodichloromethane	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromoform	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromomethane	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon Disulfide	ND	ND	9.8	ND	ND	ND	ND	ND	ND
Carbon Tetrachloride	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloromethane	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,3-Dichloropropene	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibromochloromethane	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene chloride	ND	ND	ND	ND	ND	ND	ND	ND	ND
Styrene	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	ND	ND	15	11	11	ND	ND	ND	ND
Toulene	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total Xylenes	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	ND	ND	ND	7.0	7.3	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl chloride	ND	ND	ND	ND	ND	ND	ND	ND	ND

ND = not detected; MEK = methyl ethyl ketone; MIBK = methyl isobutyl ketone.

	Exceeded Pennsylvania Primary Drinking Water

Table 22. NETL-MGN March 2002 Groundwater Data for the Morgantown Aquifer

Parameter	Sample Location			
	D1-M	D2-M	D3-M	D4-M
pH (s.u)	6.9	9.0	7.3	6.6
Specific Conductance (μmhos)	380	580	520	360
Temperature (° C)	12.0	12.1	11.0	10.9
Arsenic (total, mg/L)	0.0073	0.0057	ND	ND
Barium (total, mg/L)	0.17	0.17	0.85	0.38
Cadmium (total, mg/L)	ND	ND	ND	ND
Chromium (total, mg/L)	ND	ND	ND	ND
Lead (total, mg/L)	ND	0.0052	ND	ND
Mercury (total, mg/L)	ND	ND	ND	ND
Selenium (total, mg/L)	ND	ND	ND	ND
Silver (total, mg/L)	ND	ND	ND	ND
Iron (total, mg/L)	10	8.8	ND	ND
Manganese (total, mg/L)	1.2	0.3	0.052	1.6
Sodium (total, mg/L)	6.6	120	38	9.6
Vanadium (total, mg/L)	ND	ND	ND	ND
Benzene (mg/L)	ND	ND	ND	ND
Toluene (mg/L)	ND	ND	ND	ND
Ethylbenzene (mg/L)	ND	ND	ND	ND
Total Xylenes (mg/L)	ND	ND	ND	ND
Total Organic Halides (mg/L)	ND	ND	ND	ND
Chloride (mg/L)	17	ND	ND	47
Sulfate (mg/L)	30	4.2	17	7.2
Nitrate Nitrogen (mg/L)	0.082	0.3	0.072	0.057
Fluoride (mg/L)	0.061	0.38	0.13	0.12
Total Recoverable Phenolics (mg/L)	ND	ND	ND	ND
Cyanide (total, mg/L)	ND	ND	ND	ND
Total Organic Carbon (mg/L)	3.4	3.7	2.4	1.9
Naphthalene (μg/L)	ND	ND	ND	ND
Other Semivolatiles	ND	ND	ND	ND

ND = not detected; s.u. = standard units.

Table 23. NETL-MGN March 2002 Groundwater Data for the A Aquifer

Parameter	Sample Location												
	A	B	SP1-A	SP4-A	SP8-A	SP9-A	I	J	K	L	M	N	GAS-4
pH (s.u)	6.67	6.45	6.25	6.19	6.0	6.1	6.11	5.48	5.61	5.5	4.62	4.73	7.05
Specific Conductance (μmhos)	260	190	210	300	340	1800	450	760	1000	2100	400	790	1600
Temperature (° C)	12.1	11.3	10.8	12.7	13.3	12.4	13.8	14.1	11	13.4	10	12.9	14.8
Arsenic (total, mg/L)	ND	ND	ND	ND	ND	ND	0.021	ND	ND	ND	ND	ND	ND
Barium (total, mg/L)	0.34	0.2	0.13	0.034	0.29	0.094	0.88	0.47	0.1	0.064	0.041	0.13	0.11
Cadmium (total, mg/L)	ND	ND	ND	ND	ND	ND	ND	0.0005	0.0017	0.0032	ND	0.0009	ND
Chromium (total, mg/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Lead (total, mg/L)	ND	ND	ND	ND	ND	ND	0.016	ND	ND	ND	ND	ND	ND
Mercury (total, mg/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Selenium (total, mg/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Silver (total, mg/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Iron (total, mg/L)	19	28	38	1.3	35	0.45	54	0.89	ND	1.5	1.9	0.78	9.6
Manganese (total, mg/L)	0.82	1.3	1.6	0.4	2.3	1.4	0.43	0.097	0.94	0.25	1.3	0.4	0.7
Sodium (total, mg/L)	6.3	10	14	7.2	6.4	190	19	53	100	210	24	54	22
Vanadium (total, mg/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzene (mg/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene (mg/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene (mg/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total Xylenes (mg/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total Organic Halides (mg/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloride (mg/L)	ND	ND	2.7	27	40	410	49	140	220	460	37	160	310
Sulfate (mg/L)	16	23	64	20	9.6	86	48	50	52	120	95	70	100
Nitrate Nitrogen (mg/L)	ND	0.053	ND	0.08	ND	0.95	ND	0.72	1.1	1.1	0.14	0.59	0.16
Fluoride (mg/L)	0.054	ND	ND	0.063	0.057	ND	ND	ND	0.24	0.29	0.14	0.058	0.83
Total Recoverable Phenolics (mg/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cyanide (total, mg/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total Organic Carbon (mg/L)	3.1	2.1	2.3	2.1	1.9	1.1	2.5	1.7	2.9	3.8	3.5	3.2	5.5
Naphthalene (μg/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Other Semivolatiles	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ND = not detected; s.u. = standard units.

Table 24. NETL-MGN March 2002 Groundwater Data for the B-C Aquifer

Parameter	Sample Location				
	11	SP2-BC	32A	31	GAS-5
pH (s.u)	6.21	7.25	4.85	5.31	6.81
Specific Conductance (μmhos)	600	530	1600	680	780
Temperature (° C)	11.9	11.2	12	14.2	12.8
Arsenic (total, mg/L)	ND	ND	ND	ND	ND
Barium (total, mg/L)	0.85	0.032	0.049	0.068	0.068
Cadmium (total, mg/L)	ND	ND	0.0012	ND	ND
Chromium (total, mg/L)	ND	ND	ND	ND	ND
Lead (total, mg/L)	ND	ND	ND	ND	ND
Mercury (total, mg/L)	ND	ND	ND	ND	ND
Selenium (total, mg/L)	ND	ND	ND	ND	ND
Silver (total, mg/L)	ND	ND	ND	ND	ND
Iron (total, mg/L)	ND	1.4	ND	1.4	0.84
Manganese (total, mg/L)	0.051	0.16	2	3.2	0.18
Sodium (total, mg/L)	39	3.2	190	61	29
Vanadium (total, mg/L)	ND	ND	ND	ND	ND
Benzene (mg/L)	ND	ND	ND	ND	ND
Toluene (mg/L)	ND	ND	ND	ND	ND
Ethylbenzene (mg/L)	ND	ND	ND	ND	ND
Total Xylenes (mg/L)	ND	ND	ND	ND	ND
Total Organic Halides (mg/L)	ND	ND	ND	ND	ND
Chloride (mg/L)	ND	8	370	140	75
Sulfate (mg/L)	18	18	100	48	100
Nitrate Nitrogen (mg/L)	ND	0.52	0.98	0.21	0.076
Fluoride (mg/L)	0.11	0.09	0.15	ND	0.12
Total Recoverable Phenolics (mg/L)	0.1	ND	ND	ND	ND
Cyanide (total, mg/L)	ND	ND	ND	ND	ND
Total Organic Carbon (mg/L)	2.4	2.7	3.6	3.3	6.4
Naphthalene (ug/L)	ND	ND	ND	ND	ND
Other Semivolatiles	ND	ND	ND	ND	ND

ND = not detected; s.u. = standard units.

Table 25. NETL-MGN August 2002 Groundwater Data for the Morgantown Aquifer

Parameter	Sample Location			
	D1M	D2M	D3M	D4M
pH (s.u)	6.78	8.99	7.52	6.7
Specific Conductance (μmhos)	340	510	440	370
Temperature (° C)	16.8	16.9	16.8	15.7
Arsenic (total, mg/L)	0.012	ND	ND	ND
Barium (total, mg/L)	0.21	0.18	0.86	0.4
Cadmium (total, mg/L)	ND	ND	ND	ND
Chromium (total, mg/L)	ND	ND	ND	ND
Lead (total, mg/L)	ND	0.0062	ND	ND
Mercury (total, mg/L)	ND	ND	ND	ND
Selenium (total, mg/L)	ND	ND	ND	ND
Silver (total, mg/L)	ND	ND	ND	ND
Iron (total, mg/L)	15	5.8	ND	ND
Manganese (total, mg/L)	1.3	0.48	0.051	0.024
Sodium (total, mg/L)	7.2	110	33	12
Vanadium (total, mg/L)	ND	ND	ND	ND
Benzene (mg/L)	ND	ND	ND	ND
Toluene (mg/L)	ND	ND	ND	ND
Ethylbenzene (mg/L)	ND	ND	ND	ND
Total Xylenes (mg/L)	ND	ND	ND	ND
Total Organic Halides (mg/L)	ND	ND	ND	ND
Chloride (mg/L)	24	2.2	2.8	50
Sulfate (mg/L)	29	74	16	8.1
Nitrate Nitrogen (mg/L)	0.055	0.23	ND	0.2
Fluoride (mg/L)	0.093	0.42	0.14	0.11
Total Recoverable Phenolics (mg/L)	ND	ND	0.0053	ND
Cyanide (total, mg/L)	ND	ND	ND	ND
Total Organic Carbon (mg/L)	4.0	3.2	3.1	1.6
Naphthalene (μg/L)	ND	ND	ND	ND
Other Semivolatiles	ND	ND	ND	ND

ND = not detected; s.u. = standard units.

Table 26. NETL-MGN August 2002 Groundwater Data for the A Aquifer

Parameter	Sample Location												
	A	B	SP1A	SP4-A	SP8A	SP9A	I	J	K	L	M	N	GAS-4
pH (s.u)	6.5	6.95	6.24	6.18	6.04	6.89	6.09	5.07	4.72	6.26	4.49	4.72	6.64
Specific Conductance (□mhos)	220	150	170	280	280	1400	390	670	1100	1300	380	680	1900
Temperature (□ C)	16.3	17.6	14.9	17.3	18.2	16.9	19.1	19.5	19.3	16.5	20.3	18.2	19.4
Arsenic (total, mg/L)	ND	ND	ND	ND	ND	ND	0.013	ND	ND	ND	ND	ND	ND
Barium (total, mg/L)	0.37	0.23	0.13	0.043	0.36	0.18	0.63	0.18	0.092	0.078	0.042	0.094	0.12
Cadmium (total, mg/L)	ND	ND	ND	ND	ND	0.001	ND	ND	ND	ND	ND	ND	ND
Chromium (total, mg/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Lead (total, mg/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0069	ND	ND	ND
Mercury (total, mg/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Selenium (total, mg/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0071	ND	ND	ND
Silver (total, mg/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Iron (total, mg/L)	18	29	37	1.1	36	0.44	37	0.92	ND	8.2	4.1	0.33	5.9
Manganese (total, mg/L)	0.76	1.4	1.5	0.48	2.4	1.2	0.37	0.29	1.5	0.1	1.7	0.41	0.31
Sodium (total, mg/L)	6.0	4.7	12	7.5	7.7	170	24	59	110	150	26	54	17
Vanadium (total, mg/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzene (mg/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene (mg/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene (mg/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total Xylenes (mg/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total Organic Halides (mg/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloride (mg/L)	1.3	4.6	350	28	41	380	54	170	290	300	50	200	390
Sulfate (mg/L)	7.2	19	45	8.4	10	84	44	40	63	72	96	69	96
Nitrate Nitrogen (mg/L)	ND	ND	ND	ND	ND	0.57	ND	0.6	1.7	0.75	0.11	0.44	0.12
Fluoride (mg/L)	0.065	0.05	ND	0.071	0.061	ND	ND	ND	0.37	0.24	0.18	0.072	0.12
Total Recoverable Phenolics (mg/L)	0.011	0.0064	0.0057	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cyanide (total, mg/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total Organic Carbon (mg/L)	3.2	3.6	4.2	2.9	3.9	2.5	2.7	1.7	2.7	4.9	3.0	2.8	7.4
Naphthalene (□g/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Other Semivolatiles	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ND = not detected; s.u. = standard units.

Table 27. NETL-MGN August 2002 Groundwater Data for the B-C Aquifer

Parameter	Sample Location				
	11	SP2-BC	32A	31	GAS-5
pH (s.u)	6.3	6.9	4.79	5.52	6.22
Specific Conductance (μmhos)	450	440	1200	740	750
Temperature (° C)	16.3	14.7	20.7	17.8	18.7
Arsenic (total, mg/L)	ND	ND	ND	ND	ND
Barium (total, mg/L)	0.88	0.026	0.043	0.09	0.1
Cadmium (total, mg/L)	ND	ND	ND	ND	ND
Chromium (total, mg/L)	ND	ND	ND	ND	ND
Lead (total, mg/L)	ND	ND	ND	ND	ND
Mercury (total, mg/L)	ND	ND	ND	ND	ND
Selenium (total, mg/L)	ND	ND	ND	ND	ND
Silver (total, mg/L)	ND	ND	ND	ND	ND
Iron (total, mg/L)	ND	ND	ND	0.62	0.51
Manganese (total, mg/L)	0.052	0.036	2	4.5	2.7
Sodium (total, mg/L)	34	3.6	130	72	33
Vanadium (total, mg/L)	ND	ND	ND	ND	ND
Benzene (mg/L)	ND	ND	ND	ND	ND
Toluene (mg/L)	ND	ND	ND	ND	ND
Ethylbenzene (mg/L)	ND	ND	ND	ND	ND
Total Xylenes (mg/L)	ND	ND	ND	ND	ND
Total Organic Halides (mg/L)	ND	ND	ND	ND	ND
Chloride (mg/L)	2.7	8.5	340	300	88
Sulfate (mg/L)	13	14	97	49	74
Nitrate Nitrogen (mg/L)	ND	0.32	0.067	0.055	ND
Fluoride (mg/L)	0.14	0.091	0.15	0.053	0.12
Total Recoverable Phenolics (mg/L)	0.0082	ND	ND	ND	ND
Cyanide (total, mg/L)	ND	ND	ND	ND	ND
Total Organic Carbon (mg/L)	3.6	4.7	3.3	2.8	5.9
Naphthalene (μg/L)	ND	ND	ND	ND	ND
Other Semivolatiles	ND	ND	ND	ND	ND

ND = not detected; s.u. = standard units.


DEPARTMENT OF ENERGY
UNITED STATES OF AMERICA